1972

An Evaluation of Alternative Accounting Flow Variables for Investor Use.

Louis Serafino Corsini
Louisiana State University and Agricultural & Mechanical College

AN EVALUATION OF ALTERNATIVE ACCOUNTING FLOW VARIABLES FOR INVESTOR USE

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

in

The Department of Accounting

by
Louis Serafino Corsini
BSBA, Boston College, 1961
MBA, Boston College, 1968
December, 1972

ACKNOWLEDGEMENTS

I gratefully acknowledge my indebtedness to Dr. Jerry D. Siebel for providing intellectual stimulation and conscientious guidance throughout the entire project. I also acknowledge my indebtedness to Dr. James W. Pattillo for his faithful counsel and to Harlan Chizen and Mrs. D. H. Bowers for their computer services. I express my appreciation to my wife Marilyn for the encouragement and patience she has shown during the past three years, and for her and Dorothy's editing suggestions for the final manuscript.

Lastly, I acknowledge the helpful suggestions offered by my colleagues at Boston College and the typing services of Janet, Denise, Pam, Claire and Patricia.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Corsini, Louis Serafino, B.S.B.A. Boston College, 1961
M.B.A.,Boston College, 1968
Doctor of Philosophy, Fall Commencement, 1972.
Major: Accounting; Minors: Quantitative Methods, Business Finance
An Evaluation of Alternative Accounting Flow Variables for Investor Use
Dissertation directed by Professor Jerry D. Siebel
Pages in Dissertation, 152. Words in Abstract, 543.

An important justification for the existence of the accounting discipline is its ability to provide information which is useful in the investor's decision-making process. However, theoretical considerations cast doubt upon the usefulness of certain generally accepted accounting principles as they are applied in the preparation of the income statement. Specifically, the results of theorizing indicated that the present income model could be improved upon by eliminating nonrecurring items, by substituting purchases for cost-of-goods-sold and by excluding the effects of depreciation. To test these assertions, flow variables consistent with generally accepted accounting principles were compared with non-accepted alternatives in the form of competing hypotheses. The criterion used to evaluate the alternative flow variables was their relative ability to predict a risk-adjusted rate of return from a common stock investment holding.

The ability of accounting flow variables to predict a risk-adjusted rate of return deriving from a future holding period would provide ideal evidence of usefulness. However, a priori expectations of discovering a lagged relationship in an efficient market environment were doubtful. Nevertheless the tests were performed using 1958-1970 data from approximately two hundred and forty companies for thirty alternative holding periods, and the results were consistent with the a priori

expectations. The speed with which the market reacts to publicly available information utterly negates the possibility of earning abnormal returns with financial statement data.

The data was then tested to determine the extent of contemporaneous association existing between the alternative flow variables and the risk-adjusted rate of return. The a priori expectations were that such a relationship does exist. For the period extending from 1961-67 the a priori expectations of contemporaneous association were confirmed. However, the findings were contrary to those suggested by the theory. Specifically the findings indicated that the market reacted more vigorously to those economic events impounded by net income available to common stockholders than it did to the economic events reflected by the alternative accounting variables suggested by the theory. The usefulness of annual accounting data in an efficient market environment lies in its ability to provide supportive and corroborative evidence for equilibrium market prices. This justification exists only as long as accounting data and market movements reflect the same underlying events.

Tests on the most recent data (1968 and 1969) indicated that no contemporaneous relationship existed between the alternative accounting variables and the risk-adjusted rate of return. One explanation offered is that annual accounting flow data impounds the same underlying events as those impounded by alternative data sources but due to the effects of inflation the market does not view the present model for income determination as satisfactorily reporting those events. The more cogent explanation is that the accounting data did not impound the same underlying events as alternative information sources and the market participants are

apprised of this and view annual accounting data as a non-useful data source. Either condition poses a dire threat to the future development of the accounting profession.

These findings indicate that the accounting profession, and specifically those who set the standards for reporting the results of operations might seriously consider issuing a caveat averring that the traditional "all purpose" statements may not be fulfilling the informational needs of the individual investor.

CHAPTER I

INTRODUCTION AND OVERVIEW

A significant number of definitive studies in accounting have emphasized that accounting data should provide meaningful information to a diversity of interested parties. Almost without exception, these studies have catalogued the residual equity investor among the prime beneficiaries of accounting data. Such an objective is laudable, but furthermore there has been the presumption, without formal scientific justification, that the accounting data being generated by the accounting process does in fact contain information which is useful in making common stock investment decisions. However, the evidence indicates that prior to the 1960's no concerted effort had been made to show the relationship between accounting data and the needs of the investor.[1] Only recently has the accounting profession demonstrated a willingness to try to specify the relationship between accounting data and the information needs of the investor. This study provides a theoretical foundation for the existence of that relationship and tests these a priori suppositions by empirical investigation.

THE INVESTMENT DECISION

The total psychology behind an investor's activities is indeed

---

[1] G. J. Staubus, A Theory of Accounting to Investors (Berkeley, California: University of California Press, 1961), Chap. 1.

difficult, perhaps impossible to explain. He is confronted with practically an unlimited number of alternative investments and combinations of investments, each of which is characterized by varying degrees of expected return and uncertainty,[2] and he must make decisions to buy, to sell, to hold, or to abstain. The decision variables, decision rules, and their interactions, which constitute the investor's decision model are difficult to specify. Nevertheless, it has been suggested that investors maximize expected utility by sacrificing the consumption of present wealth (assets) with the expectation of receiving larger amounts of wealth at some future time.[3]

The effect of common stock price changes on wealth is clear. A price increase implies an increase in wealth and a price decrease implies a decrease in wealth. Assuming an investor seeks to maximize his wealth over specified holding periods, subject to his risk-aversion constraint, future common stock price changes and dividends are his prime concern, both of which are succinctly captured in the formulation of rate of return on common stock, defined:[4]

$$r_t = \frac{(P_{t+1} - P_t) + D_t}{P_t} \qquad (1.1)$$

---

[2] H. Markowitz, "Portfolio Selection," Journal of Finance, Vol. VII, No. 1 (March, 1952), p. 77.

[3] John von Neumann and Oskar Morgenstern, Theory of Games and Economic Behavior (2d ed.: Princeton: Princeton University Press, 1947).

[4] J. C. Francis and S. H. Archer, Portfolio Analysis (Englewood Cliffs: Prentice-Hall, Inc., 1971), p. 10.

where:

P_t = price paid at the beginning of some holding period.

P_{t+1} = price at the end of the holding period.

D_t = dividends received during the holding period.

r_t = rate of return earned over period t.

It can be seen from this basic formulation that prediction is a necessary condition before a decision can be made, and even though the investor's decision model cannot be generalized beyond the wealth-maximization criterion, it is clear that prediction is an inherent part of decision making.[5] Thus, if the financial accounting process can generate data which can be used to predict rate of return, such data will be useful to the investor.

STATEMENT OF THE PROBLEM

An important justification for the existence of the accounting discipline is its ability to provide information which is useful in the investor's decision-making process.[6] However, theoretical considerations from finance and the behavioral sciences cast doubt upon the usefulness of certain generally accepted accounting principles as they are applied in the preparation of the income statement. Specifically, the theory (outlined below) suggests that the principles of income determination relating to:

---

[5] The Committee on Accounting Theory Construction and Verification, "Report of the Committee on Accounting Theory Verification," The Accounting Review, Supplement to Vol. XLVI (1971), p. 63.

[6] Committee to Prepare a Statement of Basic Accounting Theory, A Statement of Basic Accounting Theory (Evanston, Illinois: American Accounting Association, 1968), p. 4.

1. The Inclusion of Nonrecurring Items
2. Depreciation Accounting
3. Inventory-Cost of Sales Accounting

detract from the usefulness of the resulting net income flow variable.

The inclusion of non-recurring, extraordinary transactions in the computation of net income impairs the usefulness of that flow variable by diminishing the net effect of those transactions which are normal, ordinary and recurring. While nonrecurring items are a part of the earnings history of an entity, their participation in the determination of net income leads to incorrect inferences concerning the trend and stability of that flow variable.[7] Therefore, a flow variable which considers only normal, ordinary, recurring transactions should be more useful to the investor than the present net income flow variable.

Accrual accounting, per necessity, requires subjective estimates. Depreciation accounting particularly, is characterized by estimates of the asset valuation base, the estimated useful life and the salvage value at the end of the service life. Furthermore, depreciation accounting does not explicitly attempt to measure the flow of services generated by fixed tangible assets. The difficulties involved in making the required estimates and the deliberate avoidance of measuring service flows may reduce the ability of traditional accounting methods to adequately convey complex economic activities. Therefore, since the computation of depreciation is not relevant in the measurement and reporting of cash

---

[7] Accounting Principles Board, Reporting the Results of Operations, Opinion No. 9 (New York: American Institute of Certified Public Accountants, December, 1966), pp. 110-111.

flows,[8] a flow variable which is not dependent on depreciation procedures would appear to be more useful to the investor.

The adherence to historical costs requires the use of values that have become outmoded with the passage of time. The propriety of matching historical inventory inputs with current revenues is questionable due to the difficulty of interpreting the difference. In addition, as in the case of depreciation accounting, deliberate and inherent biases exist in the principles governing the allocation between asset and expense.[9] Therefore, reliance on a flow variable which is not encumbered by these difficulties would be more useful to the investor than the present income model.

This research will compare the usefulness of flow variables generated from these generally accepted accounting principles with the usefulness of alternative flow variables suggested by the theory.

PREDICTIVE ABILITY AS THE CRITERION

Outputs from the accounting system are both empirical (e.g., the measure of cash position) and analytical (e.g., net income).[10] Only empirical outputs can be verified by physical observation; analytical outputs must be evaluated by their usefulness. The determination of which kinds of accounting data are most useful to the investor must be resolved by the imposition of selected criteria. Since accounting data

---

[8] Eldon S. Hendriksen, Accounting Theory (Revised ed.; Homewood: Richard D. Irwin, Inc., 1970), p. 384.

[9] Ibid., p. 238.

[10] The Committee on Accounting Theory Construction and Verification, op. cit., p. 60.

are necessarily surrogates of economic activities, they must capture relevant aspects of reality. Thus one attribute that accounting data must possess is "explaining power" or, stated another way, the data must have logical propriety. While this is intuitively appealing, it is insufficient because many alternatives in accounting have logical propriety. On the other hand, it has been shown that the assumptions upon which a theory is based do not have to be realistic in order to be useful.[11] An additional criterion is needed--one that evaluates alternative accounting data in terms of the end in view. Such a criterion is predictive ability:

> The predictive ability criterion presupposes that alternatives under consideration are conceptually acceptable and that each alternative has a theory upon which it rests. This theory provides an explanation as to why a given alternative is expected to be related to the event being predicted and allows the investigator to generalize from sample results.[12]

The predictive ability criterion is prominent in recent accounting literature, although the variable to be predicted varies among different authors. According to Sprouse, "the primary purpose of the measurement of last year's income reported to investors is to provide a basis for predicting future years' income."[13] A Committee of the American Accounting Association had the following remarks:

---

[11] Milton Friedman, Essays in Positive Economics (Chicago, Illinois: University of Chicago Press, 1953), Part I.

[12] W. Beaver, J. Kennelly and W. Voss, "Predictive Ability as a Criterion for Evaluating Accounting Data," The Accounting Review, Vol. XLIII, No. 4 (October, 1968), p. 677.

[13] R. Sprouse, "The Measurement of Financial Position and Income: Purpose and Procedure," Research in Accounting Measurement, AAA Collected Papers 1966), ed. R. Jaidicke, Y. Ijiri, and O. Nielson (Menasha, Wisconsin: George Banta Co., Inc., 1966), p. 106.

> Almost all external users of financial information reported by a profit-oriented firm are involved in efforts to predict the earnings of the firm for some future period. Such predictions are most crucial in the case of present and prospective equity investors and their representatives--considered by many to be the most important user group. Future earnings are the chief determinant of future dividends and future market price of shares, which, when taken together, are generally considered to provide the primary basis for establishing a subjective value for the shares in the mind of the user. The past earnings of the firm are considered to be the most important single item of information relevant to the prediction of future earnings. It follows from this that past earnings should be measured and disclosed in such a manner as to give a user as much aid as practicable in efforts to make this prediction with a minimum of uncertainty.[14]

Both of the above quotations indicate that tests of the relative predictability of alternative income constructs must specify the ultimate object of prediction. However, the relationship between alternative income constructs and future values of the selected object must be specified as well.[15] It is this relationship that has received so little attention from the accounting profession in past years.

This study will determine the ability of specified accounting flow variables to predict a risk-adjusted rate of return from a common stock investment in a holding period subsequent to the accounting period. The results of theorizing indicate, on an *a priori* basis at least, that the income statement contains information which security markets find useful. Briefly, this is due to the fact that the income statement purports to measure revenue and expense events which will ultimately be

---

[14]Committee to Prepare a Statement of Basic Accounting Theory, *op. cit.*, pp. 23-24.

[15]Lawrence Revsine, "Predictive Ability, Market Prices and Operating Flows," *The Accounting Review*, Vol. XLVI, No. 3 (July, 1971), p. 488.

resolved in the form of cash receipts and disbursements. These events are relevant to the market participants because they provide an indication of the future cash stream which will ultimately accrue to investors, either in the form of dividends or as proceeds from the stock selling price at the end of a holding period. Thus, if empirical investigation can reveal the existence of a lagged relationship between alternative accounting flow variables and a risk-adjusted rate of return from a common stock investment, this would provide ideal evidence of the usefulness of annual accounting data.

ALTERNATIVE ACCOUNTING FLOW VARIABLES

It is postulated in this study that deficiencies in selected principles of income determination may be improved upon by the substitution of purchases for cost-of-goods-sold and non-consideration of depreciation, as well as the elimination of non-recurring items. These modifications should improve the usefulness of the data contained in the income statement.

To test these assertions, flow variables consistent with generally accepted accounting principles are compared with non-accepted alternatives in the form of competing hypotheses. The accounting data used in this study consists of four different flow variables whose financial statement data were available from 1958-1970.

The four flow variables are:

Net Income Available to Common Stockholders (EA)

Net Recurring Income (ER)

Current Recurring Flow (CR)

Net Recurring Income less Changes in Inventories (ER-ΔI).

The tests are designed to provide empirical evidence regarding the usefulness of alternative accounting flow variables, where usefulness is defined as the ability to predict the risk-adjusted rate of return deriving from a common stock investment in a future holding period. This leads to the formulation and testing of the following hypotheses:

H_1: Net Income Available to Common Stockholders (EA) is more useful to investors in common stock than Net Recurring Income (ER) for predicting the risk-adjusted rate of return.

H_2: Net Income Available to Common Stockholders (EA) or Net Recurring Income (ER) is more useful to investors in common stock than Current Recurring Flow (CR) for predicting the risk-adjusted rate of return.

H_3: Net Income Available to Common Stockholders (EA) or Net Recurring Income (ER) is more useful to investors in common stock than Net Recurring Income less Changes in Inventories (ER-ΔI) for predicting the risk-adjusted rate of return.

A PRIORI EXPECTATIONS IN AN EFFICIENT MARKET ENVIRONMENT

Since it has been postulated that investors are desirous of maximizing their wealth through common stock investment returns, mention must be made of the nature of the security markets in which investors will

participate. There is presently an ample amount of empirical evidence which suggests that major security exchanges are good examples of "efficient" markets. An "efficient" market is one where large numbers of rational wealth-maximizers actively compete with each other in trying to predict future market values of individual securities, and where important current information is almost freely available to all the participants.[16] The impact of this competition on security prices is that such prices change instantly and in an unbiased fashion as the participants receive and act upon new information, which of course includes earnings reports.[17] However, the instantaneous adjustment is really two faceted:

> First, actual prices will initially overadjust to changes in intrinsic value as often as they will underadjust. Second, the lag in the complete adjustment of actual prices to successive new intrinsic values will itself be an independent random variable with the adjustment of actual prices sometimes preceding the occurrence of the event which is the basis of the change in intrinsic values (i.e., when the event is anticipated by the market before it actually occurs) and sometimes following.[18]

Essentially the efficient market hypothesis asserts that the actual price of a security is an unbiased estimate of its intrinsic or fundamental value because of this price adjustment process. Thus, apart from fortuitous choice, only a superior fundamental analyst can earn abnormal returns in such a market, which means he has information no one else has, or has greater insight into available information from which he can glean new information.

---

[16] Eugene F. Fama, "What Random Walk Really Means," The Institutional Investor, Vol. II, No. 4 (April, 1968), p. 38.

[17] Revsine, op. cit., p. 484.

[18] Fama, op. cit., p. 39.

Fama has outlined three forms of market efficiency.[19] The weak form states that knowledge of past security returns will not assist in predicting future returns. The semi-strong form states that no abnormal returns can be earned using publicly available information, which of course includes financial statements. And finally a strong form which posits that no information, whether it is public or inside, will be of use in the quest for abnormal returns. In each case, prices react quickly and unbiasedly to new information. Beaver states that there is not a single prominent study of security price behavior that has documented an inefficiency in the semi-strong form[20] and he furthermore provides evidence which is remarkably consistent with the notion of an efficient market of the semi-strong variety.[21]

The existence of efficient markets holds very definite implications for the usefulness of accounting data. Simply stated, a lagged relationship between accounting flow variables and the risk-adjusted rate of return cannot exist in such an environment. However, while the evidence is strong, the notion of the existence of efficient markets is not a settled matter and the hypothesis should be subjected to further testing. Therefore, the tests are performed with the a priori expectation that a lagged relationship will not be uncovered. If a relationship is

---

[19] E. Fama, "Efficient Capital Markets: A Review of Theory and Empirical Work," Journal of Finance, Vol. XXV (May, 1970), pp. 383-417.

[20] William H. Beaver, "The Behavior of Security Prices and Its Implications for Accounting Research (Methods)," Working Paper #203 (Stanford, California: Graduate School of Business Stanford University, May, 1971), p. 29.

[21] William H. Beaver, "The Information Content of Annual Earnings Announcements," Empirical Research in Accounting: Selected Studies, 1968, Supplement to Journal of Accounting Research, Vol. VI (Chicago: Institute of Professional Accountancy, 1969), pp. 67-92.

discovered, it will be interpreted as proof that the accounting flow variables are able to predict future market performance of common stocks and *prima facie* evidence disproving the efficient market hypothesis. If, on the other hand, the evidence is consistent with the *a priori* expectation, the accounting variables will be deemed unable to predict future market performance and the relationship between the alternative accounting flow variables and the risk-adjusted rate of return over concurrent time periods will then be examined to determine the extent of contemporaneous association, since, as outlined below, the degree of contemporaneous association is also a measure of the relative usefulness of the data to investors.

The *a priori* grounds for expecting to find a contemporaneous association rest upon three major assumptions:

1. Accounting measures the proper economic events, i.e. those events which will ultimately determine the future cash flows accruing to the investor.

2. One characteristic of the nature of these events is that they are systematically related. Their stability over time provides a basis for predicting the trend and variability of future cash flows.

3. An efficient market will instantly and unbiasedly impound this information into common stock prices and thus assure a contemporaneous association.

If an association is observed, it will be interpreted that accounting flow variables reflect the same underlying events that are reflected in security prices. The usefulness of the accounting data in such an environment lies

in its ability to substantiate equilibrium market prices. The implication for investors is that they can continue to rely upon the more timely and perhaps less expensive information sources that they have been utilizing. Beaver, Kettler and Scholes examined the degree of association between market-determined measures of risk and accounting risk measures and found that there was a high degree of contemporaneous association between the two.[22] One interpretation of these results that the authors offered which is germane to this study was that "the accounting data and the market risk measure are jointly reflecting the same underlying events and investors are reacting to those events, rather than to the accounting data themselves."[23] If no association is observed, unequivocal statements averring that the accounting flow variables do not reflect the same underlying events that are reflected in security prices cannot be made without further investigation. The strongest statement that can be made is that if a relationship between the accounting flow variables and the risk-adjusted rate of return does in fact exist, the predictive model used herein is inadequate to convey that relationship.

THE EXPECTATIONAL MODEL

Many other studies have endeavored to predict future net income. Attempting to predict future income from present income is a fruitless exercise.[24] Little is known about the psychological mechanics

---

[22] W Beaver, P. Kettler, and M. Scholes, "The Association Between Market Determined and Accounting Determined Risk Measures," The Accounting Review, Vol. XLV, No. 4 (October, 1970), pp. 654-82.

[23] Ibid., p. 679.

[24] Revsine, op. cit., p. 496.

of market adjustment, and about the way in which the market digests and transforms information into the appropriate rate of return. Therefore, the variable to be predicted should be one of economic relevance to the investor, namely that portion of the rate of return which stems from events unique to the particular company. The exact specification of the risk-adjusted rate of return which the investor must predict, assumes equilibrium in the capital markets and is based on the seminal work in market-line theory done by Sharpe, Markowitz, Lintner, Fama and others.[25] The model specifies the expected, equilibrium risk and return parameters for individual securities, with risk being defined in a portfolio context. In addition, the model is designed to measure the deviation between expected returns and actual returns realized during a given holding period. This deviation is the variable of interest to the investor and is defined in this study as the risk-adjusted rate of return.

The determination of the risk-adjusted rate of return is accomplished in two steps. First, the volatility of each stock must be measured and evaluated. The rise and fall of stock in general is well

---

[25] The development of capital market theory can be found in the four works below:

William F. Sharpe, "Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk," The Journal of Finance, Vol. XIX (September, 1964), pp. 425-442.

Harry M. Markowitz, Portfolio Selection: Efficient Diversification of Investments (New York: John Wiley & Sons, 1959).

John Lintner, "The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets," Review of Economics and Statistics, Vol. XLVII (February, 1965), pp. 13-37.

Eugene F. Fama, "Risk, Return and Equilibrium: Some Clarifying Comments," The Journal of Finance, Vol. XXIII, No. 1 (March, 1968), pp. 29-40.

measured and defined by broad market indices such as the Standard and Poor's 500 Industrial Index. Some stocks tend to magnify the movement of the market due to their own peculiarities: earnings, leverage, marketability, supply/demand, etc. These stocks are more volatile because they tend to rise more and fall more than the market. Others tend to be less volatile than the market.[26] The Sharpe Diagonal Model regresses empirical observations of ex post individual security returns over time, on ex post market returns.[27] The beta coefficient of the resulting estimated regression equation measures the extent to which a stock moves with the market. It has a direct relationship to the concept of covariance.[28]

Armed with the "beta" for each security, the second phase in the determination of the risk-adjusted rate of return is given by market-line theory of the two parameter model (expected risk, return). The essential feature of the model is that, in equilibrium, the expected return on an individual security is a positive linear function of the security's "beta" as measured by the covariance of its returns with the returns on the market portfolio.[29] Essentially the model states that the greater the risk (as defined above) an investor is willing to assume, the greater reward

---

[26] Merrill, Lynch, Pierce, Fenner and Smith, Stock Portfolio-Market Sensitivity Summary Findings and Suggestions, Unpublished material, 1971, p. 10.

[27] William F. Sharpe, "A Simplified Model for Portfolio Analysis," Management Science, Vol. 9, No. 2 (January, 1963), pp. 277-293.

[28] Beaver, Kettler, Scholes, op. cit., p. 658.

[29] Michael Jensen, "Risk, The Pricing of Capital Assets and the Evaluation of Investment Portfolios," The Journal of Business of the University of Chicago, Vol. 42, No. 2 (April, 1969), pp. 167-185, reprinted in E. Bruce Fredrikson, Frontiers of Investment Analysis (2d ed. Scranton: International Textbook Company, 1971), p. 200.

he requires to induce ownership. This rate of return is compared with the actual rate of return. The difference is the risk-adjusted rate of return which stems from those economic events which are unique to that firm.

METHODOLOGY

This study attempts to determine from empirical data the relationship between each alternative accounting flow variable (EA, ER, CR, ER-ΔI) for time period t-1 and for time period t, and the risk-adjusted rate of return for time period t. The tests of association and prediction treat the accounting variables as the independent variables and the risk-adjusted rate of return as the dependent variable.

Cross-sectional regression and correlation analysis is used to measure the association between variables. The reason for selecting this technique is succinctly stated by Chou in his introductory remarks on regression and correlation:

> This procedure is also that of prediction, and prediction is the central function of science. The main task of science is to discover the general relationships between observed variables and to state the nature of such relationships precisely in mathematical terms so that the value of one variable can be predicted on the basis of that of another.[30]

The criterion for usefulness is higher correlation between the operational measure of rate of return and a flow measure, as the flow measure is varied so that it is alternatively independent of selected accounting principles that are presently generally accepted.

---

[30] Ya-lun Chou, Applied Business and Economic Statistics (New York: Holt, Rinehart and Winston, Inc., 1963), p. 404.

The first set of tests will examine the possibility of the existence of a lagged relationship. Such a relationship would be ideal evidence of the future predictive ability of annual accounting flow data. The second set of tests will focus on the extent of contemporaneous association. These tests evaluate the accounting data in terms of their ability to substantiate equilibrium market prices.

SUMMARY

The accounting profession has traditionally asserted that it serves a useful function by reporting selected economic data on individual companies to the investment community. This hypothesis can only be validated by observing its consistency with observed behavior. This study, by empirically testing the predictive ability of alternative annual accounting flow variables, will furnish tentative evidence concerning the relative usefulness of alternative accounting procedures as they are applied in the preparation of annual accounting reports to the investor.

This chapter is an introduction and overview to the entire project. Its purpose is to establish the theoretical framework from and within which the investigation is to be conducted. The pertinent topics and the related problems which must be addressed have only been delineated and are dealt with, in depth, in the remaining chapters.

Chapter II is a review of some of the important theoretical and empirical studies that have been undertaken in this area. This provides a background on the work done to date and serves to illustrate how the methodology and theorizing of this project relates to, and in

many instances rests upon, previous work done in the field.

Chapter III examines the relationship between accounting data and the investor's rate of return. The rationale behind the investor's activities is hypothesized and related to the corporate earnings stream. The accounting process and selected principles of income determination are then analyzed in light of the investor's needs. This leads to the formulation of the hypotheses to be tested.

Chapter IV develops the expectational model that leads to the formulation of a risk-adjusted rate of return that has economic relevance to the investor. The expected utility maxim is analyzed from the perspective of a Markowitz-efficient investor. Systematic risk and the pricing of capital assets in equilibrium are then considered in view of recent developments in market-line theory.

Chapter V is the methodology chapter. It describes, in detail, the statistical procedures and mathematical formulations which are used to test the hypotheses. The sample and variable specifications are also defined.

Chapter VI discloses the results of the tests, the conclusions drawn therefrom, and the relationship between these findings and the findings of other similar investigations.

CHAPTER II

REVIEW OF RELEVANT LITERATURE

This chapter explores the work done to date by accounting theorists. Special attention is directed toward discovering the relationship between the fruits of their efforts and the resolution of the investor's problem. In most instances the relationship is insufficiently developed. The literature relevant to this study is divided into three parts: historical perspective, theoretical exposition and empirical studies.

HISTORICAL PERSPECTIVE

John Maynard Keynes once wrote that the modern age began with the sixteenth century accumulation of capital, and England's foreign investment commenced subsequent to the time that Sir Francis Drake appropriated Spanish treasure.[1] The very nature of mercantilism necessitated the development of an economic unit which would be a continuing enterprise, as opposed to a venture, and a unit which could accommodate the investment of absent owners to whom periodic returns would accrue. The corporation came into existence to meet these needs and in turn stimulated the expansion of bookkeeping into accounting by requiring that a proper distinction between capital and income be maintained. Thus the central accounting issue in a corporation concerned the computation of

---

[1] "Economic Possibilities for Our Grandchildren," Saturday Evening Post, October 11, 1930, p. 160.

periodic net income which ultimately would be made available to the owners in the form of dividends.[2] The objective of financial statements was to evaluate the performance of management in acting as fiduciary of the funds entrusted to it and investing such funds to produce a profit.[3] The statements were viewed as providing the answer to the question: "How has my investment fared?"

The early definitive works devoted to the development and exposition of accounting concepts and accounting theory usually mentioned stockholders or investors as being among the users of the financial statements prepared in accordance with the particular concepts and/or theory being advanced. But other user groups such as creditors, management, governmental authorities, labor and consumers were also being considered as the accounting data was being processed for presentation in the "all-purpose" statements. Obviously, all these interested parties cannot be served by one set of financial statements because different user groups require different kinds of information. For example, cash flow information, of some importance to equity investors, is of the utmost concern to creditors for whom it provides the primary basis for assessing the borrower's liquidity. Long-term lenders, particularly, require more information than is provided by static financial statement values. They require knowledge of future payments, availability of lines of credit, feasibility of management's plans to meet capital needs, and the priority of the claims of

---

[2] A. C. Littleton, Accounting Evolution to 1900 (New York: Reissued by Russell & Russell, a division of Atheneum House, Inc., 1966), p. 206.

[3] Arthur Young & Company, The Objective of Financial Statements: Responding to Investors' Needs, paper presented to the Accounting Objectives Study Group. (New York: Arthur Young & Co., May, 1972), Foreward.

various lenders.[4] Just as creditors have specific informational needs, so do investors. In addition to evaluating past performance, investors must be provided with information necessary to make rational investment decisions in the present about performance in the future. A review of literature in accounting theory indicates that until quite recently very little had been done to demonstrate that accounting and the accounting process provide useful information to the investor.

THEORETICAL EXPOSITION

The best known of the early advocates of the entity theory (i.e., assets = equities), William Paton, stated that: "...the stockholder's equity is elastic and residual, and residual equity is of particular importance to the accountant because it is in such an equity that much of his work comes to focus. The analytical work of the accountant, his judgments, estimates, valuations, bear upon and are of especial importance to the residual interest."[5] "In all forms of business organization the interests of the private owners are uppermost...it is hardly possible to overemphasize the influence of the private equities upon accounting principle and technique."[6] Having given priority to the investors, Paton goes on to say: "...the income statement is of little importance, showing as it does an elaboration of an element finally incorporated in the balance sheet. The balance sheet, the financial summary, on the other hand, is of the utmost consequence for our purpose."[7] However, in order to present a balance sheet, one must come to grips with the problem of

---

[4] Ibid., section entitled, Needs of Creditors.

[5] William A. Paton, Accounting Theory (New York: The Ronald Press Co., 1922), pp. 84-85.

[6] Ibid., p. 19.

[7] Ibid., p. 20.

valuation, since income and wealth calculations require that objects be "valued" in the general sense of the term.[8] The question arises: Which valuation method is most useful to the investor? Paton adhered to historical cost without demonstrating how the investor's needs were being met through the use of historical cost. Still later, while writing with Littleton, Paton continued to advocate the use of historical costs and argued that departure from cost to estimated current market values would be entirely futile from the standpoint of the measurement of periodic income.[9] Apparently this is the orthodox accounting view, as is evidenced by the great majority of the accounting literature as well as the practice of accounting.[10]

Toward the end of the 1920's, John B. Canning, an economist, published a book which purported to reconcile, compare and contrast the disciplines of accounting and economics.[11] At the time, emphasis was still on the balance sheet, though it was soon to shift to the income statement, and Canning suggested an improved theory of valuation which would in some instances move away from historical cost. He explicitly discussed valuations in terms of future benefits and expectations, something that accountants had not yet consciously subscribed to, and although he did not mention the investor specifically, his approach to the

---

[8]Robert R. Sterling, Theory of the Measurement of Enterprise Income (Lawrence, Kansas: The University Press of Kansas, 1970), p. 15.

[9]William A. Paton and A. C. Littleton, An Introduction to Corporate Accounting Standards (Chicago: American Accounting Association, 1940), pp. 123-124.

[10]Sterling, op. cit., p. 17.

[11]John B. Canning, The Economics of Accountancy (New York: The Ronald Press Company, 1929).

problem of valuation provided the seminal thinking that influenced accounting theorists who wrote subsequent to World War II, and who had come to the realization that the investor problem could not be resolved satisfactorily without considering expectations.

During the decade of the thirties, two important works were written: Stabilized Accounting by Henry Sweeney,[12] and Accounting Concepts of Profit by Stephen Gilman.[13] Sweeney was concerned with the investor's real income in terms of the purchasing power of a dollar, and price level changes. However, Sweeney was only suggesting an adjustment of cost figures in order to present common-dollar statements. While this proposal should have and did receive serious consideration by accounting thinkers, it did not show how historical costs or historical costs adjusted for price level changes were useful to the investor, given the present structure of accounting. On the other hand, Gilman, upon whom the spectacular crash of 1929 made a strong impact, recognized the need to account for the investor and placed greater emphasis on the income statement than on the balance sheet. However, his approach to income determination was a conservative one, particularly on matters of revenue recognition and strict adherence to the historical cost principle, and did not provide the investor with the necessary information for intelligent investment decisions.

Other works written during the approximately twenty-year period between 1940 and 1960 really did not have very much new to offer. They

---

[12]Henry Sweeney, Stabilized Accounting (New York: Harper & Co., 1936).

[13]Stephen Gilman, Accounting Concepts of Profit (New York: The Ronald Press Co., 1939).

all specifically identified the investor as a prime user of the financial statements but typically failed to establish the connection between the information supplied in the statements and the information needed by the investor. These works include Sanders, Hatfield and Moore's, A Statement of Accounting Principles (1938); Paton and Littleton's, An Introduction to Corporate Accounting Standards (1940); The Dickenson Lectures in Accounting (1943); The Committee on Accounting Procedures', Restatement and Revision of Accounting Research Bulletins (1953); the numerous publications by the American Accounting Association, particularly, Accounting Concepts and Standards Underlying Corporate Financial Statements (1948); Littleton's, Structure of Accounting Theory (1953); and last, but by no means least, the sage comments of George O. May, which while random and unsystemetized, nonetheless are quite relevant.

In 1961 Edwards and Bell, two economists, developed a model for the determination of net income which was markedly different from the traditional accounting approach. The authors maintained that accounting profit suffers from two basic limitations. First, costs saved by holding assets which have appreciated in value are not distinguished from operating profit (current value of output sold-current cost of related inputs); and secondly, price changes of individual assets are not recorded as they occur, and as a result current costs are excluded from the balance sheet. In order to improve accounting income measures, the authors postulated that the total gain in market value (change in current value of assets less change in current value of liabilities) for the period should first be divided into current operating profit and holding gains; and secondly, divide the holding gains into those that were anticipated and those that were a surprise. In addition, the model would separate real gains from fictional

gains through the use of price level adjustments.[14] This sort of exposition of net income would be very useful to investors primarily because the company management can be evaluated by measuring the extent to which their subjective estimates of future operating and holding gains are realized in terms of market values over the life of a plan, and the degree to which the timing of the conversion into market value was correctly anticipated. However, since market values are not available for many assets, such assets would be included at zero value when income is computed.[15] And it is this problem of determining market values that has prevented empirically testing the theory in preparation for general adoption.

In the same year George Staubus produced a stimulating work which presented a new approach to the structure of accounting theory.[16] The theory was specifically oriented toward helping investors make better investment decisions. In the very first chapter Staubus establishes the objective of the accounting process, i.e., accounting to the investor: "[Accounting], by providing information which will help holders of capital select the economic units which can use that capital most effectively and avoid those firms which cannot use it effectively can make a further contribution to the satisfaction of human wants."[17] The remainder of the chapter reviews the paucity of work done by the accounting profession in this area and then briefly outlines how accounting can provide information

---

[14]Edgar O. Edwards and Philip W. Bell, The Theory and Measurement of Business Income (Berkeley and Los Angeles: The University of California Press, 1961), Chap. IV.

[15]R. F. Salmonson, Basic Financial Accounting Theory (Belmont, California: Wadsworth Publishing Co., Inc., 1969), p. 75.

[16]George J. Staubus, A Theory of Accounting to Investors (Lawrence, Kansas: Scholars Book Co., Reprinted 1971).

[17]Ibid., p. 1.

which will be of assistance in making economic decisions by focusing on the investor future cash receipts, which in turn depend on: "(1) the firm's monetary capacity to disburse cash, (2) the management's willingness to pay the investor, and (3) the legal priority of the investor's claim."[18]

In chapter 2, Staubus points out the significance of residual equity to the investor and accountant. The residual equity measures the claim that the residual equity holders have in the enterprise. Since operations change residual equity, the income statement is the focal point of investor interest. In concluding, the author suggests that the accounting equation be revised to state: Assets minus specific equities equal residual equity, thus emphasizing the dependent position of the residual equity and that its proper measurement must be approached through assets and specific equities.[19]

Chapters 3, 4 and 5 develop the theory in full by analyzing various approaches to the measurement of assets and specific equities with an eye toward predicting future cash receipts and disbursements. The problem, of course, is the uncertainty of economic affairs, making it impossible to measure all assets and specific equities accurately. This means that residual equity is inaccurately measured, which in turn impairs investors' ability to accurately predict their future cash flow returns. Therefore, Staubus suggested that economic events (changes in assets and equities) be scrutinized, and he classified economic events into several categories which he analyzed to determine what effect they have upon residual equity. Of those events which affect residual equity, he

---

[18] Ibid., p. 15.

[19] Ibid., p. 27.

pointed out that some have a tendency to recur while others do not.[20] Since the majority of the economic events are revenue-expense events, Staubus developed his theory to the point where he could make the following remark: "The most significant characteristics of revenue-expense events from the point of view of investors, especially residual equity holders, are that they change the residual equity and that they have such a strong tendency to recur that they provide a basis for predicting future changes in residual equity."[21] And from this he justified utilizing net income before extraordinary items as a basis for predicting future returns. The last two chapters are devoted to communicating the results of operations and a rudimentary analysis thereof in accordance with the principles developed in the earlier chapters.

In 1963 the American Institute of Certified Public Accountants published, A Tentative Set of Broad Accounting Principles for Business Enterprises,[22] which was to rest on the foundation developed in an earlier study, The Basic Postulates of Accounting.[23] The introduction to the "Principles" study states: "The principles of financial accounting that are developed in this study are designed to meet all interested groups."[24] The study was not well received by the profession as evidenced by the comments at the end of the work (pp. 60-83). Typically,

---

[20] Ibid., p. 71.

[21] Ibid., p. 95.

[22] Robert T. Sprouse and Maurice Moonitz, A Tentative Set of Broad Accounting Principles for Business Enterprises, Accounting Research Study No. 3 (New York: American Institute of Certified Public Accountants, 1962).

[23] Maurice Moonitz, The Basic Postulates of Accounting, Accounting Research Study No. 1 (New York: American Institute of Certified Public Accountants, 1961).

[24] Sprouse and Moonitz, op. cit., p. 1.

criticism was aimed at the lack of logic in deriving principles from the postulates and the impracticality of implementing the proposed valuation bases.

Finally in 1966, Chambers defined accounting as: "A systematic method of retrospective and contemporary monetary calculation the purpose of which is to provide a continuous source of financial information as a guide to future action in markets."[25] The author posited that the type of financial information that an entity ought to make available in an exchange society is its current cash equivalent position so that one can determine the entity's ability to participate in the market at any particular time. Current cash equivalent is measured essentially by the resale price of the assets held by the entity. This valuation base is supported on the grounds that selling price indicates the capacity of an entity, on the basis of present holdings, to go into a market with cash for the purpose of adapting oneself to contemporary conditions.[26] However, the sales price principle is unrealistic in many real-world applications because it requires too many exceptions. Consider, for example, the sales price of work-in-process inventory, or the sales price of special purpose fixed assets; in many cases no sales prices exist. In addition, Chambers ignores goodwill, and sales price is relevant only if a firm cannot be viewed as a going concern. Because of these criticisms, Chamber's work, while a real contribution to the field, is of limited usefulness to the investor.

---

[25]Raymond J. Chambers, Accounting, Evaluation and Economic Behavior (Englewood Cliffs: Prentice-Hall, Inc., 1966), p. 102.

[26]Ibid., p. 92.

EMPIRICAL STUDIES

In addition to the theoretical exposition, Staubus also undertook three empirical studies.[27] The underlying hypothesis of each study was that accounting data are useful in making common stock investment decisions, where usefulness was defined as the ability of the accounting data to predict common stock values.

In the first phase of his work Staubus set out to determine which financial accounting variables were most closely associated with stock values. The financial variables tested were earnings, dividends, book value, current flow (earnings plus depreciation and amortization) and funds flow (recurring funds receipts less recurring funds disbursements), and the specific hypotheses were that current flows and funds flows are as closely associated with common stock values as are earnings. Stock values were determined by computing the present values of the future cash receipts that would accrue to an investor during an assumed holding period. Utilizing ex post dividend and market price data on a sample which varied from forty to forty-five securities, Staubus was able to determine the "worth" of each security by discounting the sum of the cash receipts that the investor would receive over an assumed holding period. A discount rate of six per cent was applied to all stocks in the sample and every company in the sample had positive flows for all variables.

The methodology Staubus used was to select a base year(s) for observation on the accounting variables of a particular company and at

---

[27] George J. Staubus, "The Association of Financial Accounting Variables with Common Stock Values," The Accounting Review, Vol. XL (January, 1965), pp. 119-34. _____, "Statistical Evidence of the Value of Depreciation Accounting," Abacus, Vol. 3, No. 1 (August, 1967), pp. 3-22. _____, "Testing Inventory Accounting," The Accounting Review, Vol. XLIII, No. 3 (July, 1968), pp. 413-24.

the beginning of the subsequent year assume that the stock was purchased and held for alternative holding periods ranging in length from one year to as long as twelve years. Since the value of the stock is dependent on the length of the holding period, several alternative values were computed and each was regressed on and correlated with each base-year accounting variable to determine which accounting variable was the best predictor of stock values. The performance measure was r^2 (coefficient of determination), and the accounting variable (s) with the highest r^2 was considered to be the best predictor of stock value. Altogether forty-seven different holding periods and five different base-year periods were selected, covering a period extending from January 1, 1948, to December 31, 1961. During this period economic conditions varied, and both bull and bear markets ran their course, thus the accounting variables were tested under a variety of conditions.

The results bore out the hypothesis that current flows are as closely associated with stock values as earnings, and in fact show that they are more closely associated. Funds flows for 3 or 4 years were also more closely associated with stock values than were earnings, although funds flows for one year were less reliable than earnings or current flows. And finally neither dividends nor book values were as highly associated with stock values as earnings and current flows. The significance of these findings indicate that the determination of net income in accordance with generally accepted accounting principles may not be as useful to the investor as modifications thereof.

The second phase of investigation, published about two and one-half years after the first, considered the question of whether or not funds derived from operations are a useful substitute or perhaps even an

improvement upon net income as actually determined. And Staubus set out to evaluate depreciation practices of U. S. companies. Drawing on the same data that was used in the first investigation, Staubus compared current flows (as defined earlier) with earnings to determine which was a better predictor of stock values and again used the correlation coefficient to measure association. However, this time companies were grouped into four separate categories: randomly, Fifo-Lifo, Fifo and Lifo. This was done to hold the effects of inventory accounting constant. The methodology was basically the same for computation of stock values except that the discount rate was varied. The base years and holding periods were exactly the same. The results showed that current flows were at least as closely correlated with discounted values as were earnings in each sample, and he concluded that depreciation accounting did not appear to improve the usefulness of the earnings figure.

A second part of this phase grouped companies by industry and performed the same tests, comparing current flows with earnings. The industries were steel, rail transportation, natural gas distribution, and food processing. The results showed that depreciation accounting was helpful in the rail and food industries, but not in the steel and gas industries.

A third part of this phase compared two samples, a sample composed of steel companies and one composed of railroads. In addition, the current flow variable for each company was modified by adding annual capital expenditures. Once again the same kinds of tests were performed and the results indicated that capital expenditures were not a good substitute for depreciation.

The statistical evidence of the tests involving depreciation accounting was split. No definitive statements could be made about the usefulness of depreciation accounting. A more comprehensive methodology would have been to compare samples comprised of earnings dependent on alternative depreciation methods, e.g., straight line, accelerated, etc., with current flows, provided that the data were available.

The third phase of the investigation examined the usefulness of inventory-cost of goods sold accounting. Three flows concepts not relying upon inventories were compared with three flows concepts relying upon inventories: earnings less changes in inventory balances (beginning and end of year) were compared with earnings, recurring quick flows (recurring changes in net short-term monetary assets) with recurring current flows, and quick flows including nonrecurring items with current flows including the effects of nonrecurring items. The hypothesis was that if flow variables relying upon inventories were more closely associated with common stock values than flow variables not relying upon inventories, it would be concluded that inventory accounting is useful. However, because the variable earnings minus changes in inventories was frequently negative, Staubus worked primarily with quick flows and current flows. Once again the same data base was used. Stock values were computed in the same fashion except this time a discount rate of nine per cent, after the Fisher and Lorie Study, was used. And the correlation coefficient based on natural logarithms of aggregate data for each company was used as a measure of association.

The results of the tests indicated that current recurring flows of one year were consistently superior to one year quick flows. However, as the base period was lengthened, the performance of quick flows improved,

because over the longer period the percentage difference between purchases and cost of goods sold decreases. This, of course, depends on inventory cycles within the companies, but on the average it appears that in a base period of from three to four years in length, average purchases tend to approximate average cost of goods sold.

A second set of tests were performed using a mixed sample of companies using Lifo and companies using Fifo. The variables tested were current flows vs. quick flows, and both variables included nonrecurring items. Current flows outperformed quick flows for base periods of all lengths (one, two, three or four years), and as the base period was lengthened to four years quick flows showed some improvement. These results produced further evidence that inventory-cost of goods sold accounting is useful.

A third set of tests utilized a sample comprised of steel companies and a second sample comprised of food companies. Both samples were random as to inventory method. The variables tested were recurring quick flows vs. recurring current flows. The result of the tests involving the steel sample showed recurring current flows having a closer association with stock values than recurring quick flows, for all base periods. The same results were generated when the food sample was tested, except the difference between recurring current flows and recurring quick flows was even more marked. Once again, the variable relying upon inventory accounting produced better results than those that were not. A final set of tests were devised which would test the relative merits of the Fifo and Lifo inventory methods. The hypotheses were stated as follows:

1. As between the Fifo and Lifo inventory methods,

   Lifo yields more valuable income and current flow

data for use in making common stock investment decisions.

2. As between the Fifo and Lifo inventory methods, Fifo yields book valuations of common stocks that are more useful in making common stock investment decisions.[28]

The sample design matched thirty pairs of companies. Each company in the pairings was of similar size and nature of business, and one valued inventory on a Lifo basis while the other used Fifo. Association between discounted stock values and accounting flow variables was measured in two ways.

The first way compared nonrecurring current flows with nonrecurring quick flows with book values. The results disclosed that the Lifo inventory method showed greater improvement in association when shifting from quick flows to current flows than did Fifo. However, the mean of means for the Fifo companies was greater than the mean of means for the Lifo companies, when current flows were compared. And the book values based on Fifo showed a higher association with stock values than did book values based on Lifo.[29]

The second way compared earnings with earnings minus changes in inventories. The results were mixed, although Lifo showed slight improvement over Fifo when shifting from earnings minus changes in inventory to earnings. Here too, however, the mean of means for the Fifo

---

[28]Staubus, "Testing Inventory Accounting," p. 421.

[29]These variables were also tested by using the median deviation percentage, but the results were less definitive than the tests using the correlation coefficient.

companies was greater than the mean of means for the Lifo companies when the earnings variables were compared.

The evidence from both of these tests appears to indicate that Fifo is useful for book valuations, i.e., balance sheet valuation. On the other hand, the evidence does not support the Lifo method sufficiently to confirm the hypothesis that Lifo provides a better determination of net income or other flow variable which can be used by the investor for common stock investment decisions. This phase of the investigation, while not resolving the Lifo-Fifo controversy, did provide strong evidence that accountants perform a useful function by accounting for inventory, regardless of method.

Two important empirical studies were performed to evaluate the usefulness of financial ratios to predict business failure. The first, done in 1966 by Beaver, was basically a univariate approach, as was the work of Staubus. The second, done in 1968 by Altman, took a multivariate approach. The reason for citing these two works is because they both attempt to test whether or not accounting data contain the attribute of predictive ability. Otherwise both works are dissimilar to this one with respect to the variable to be predicted, the accounting variables which predict, and methods of analysis.

The Beaver study utilized a sample of one hundred and fifty-eight firms, half of which had failed sometime during the period 1954-1964. He then computed thirty ratios for each company for each of the five fiscal years preceding failure. By using three types of analyses Beaver was able to conclude the following:

1. The ratio distributions of non-failed firms are quite stable throughout the five years before failure. The ratio distributions of the failed

> firms exhibit a marked deterioration as failure approaches. The result is a widening gap between the failed and the non-failed firms. The gap produces persistent differences in the mean ratios of failed and non-failed firms, and the difference increases as failure approaches.
>
> 2. The cash flow to total debt-ratio has the ability to correctly classify both failed and non-failed firms to a much greater extent than would be possible through random prediction. This ability exists for at least five years before failure.
>
> 3. Not all ratios predict equally well.[30]

The Altman study employed multiple discriminant analysis on a sample consisting of sixty-six firms, half of which were known to have become bankrupt. The firms were paired according to size and industry. The analysis consisted of selecting several key ratios and calculating the values thereof. The ratios for the bankrupt firms were computed as of one year prior to bankruptcy. Armed with this information, and the knowledge of each firm's solvency status, parameters were generated which were used to predict the status of a particular firm. Initially Altman applied the parameters to the prediction of the status of the same firms from which the parameters were generated. Sixty-three of the sixty-six predictions were correct. He then applied these parameters to predict the status of several additional firms not included in the original sample. The proportion of correct predictions was significantly higher than could be expected from chance alone.[31]

---

[30] William H. Beaver, "Financial Ratios as Predictors of Failure," Empirical Research in Accounting: Selected Studies, 1966 (Chicago: Institute of Professional Accounting, 1967), p. 101.

[31] Edward I. Altman, "Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy," The Journal of Finance, Vol. XXIII (September, 1968), pp. 589-609.

The final study cited herein was done by Ball and Brown (B&B).[32] By postulating that reported net income is useful to investors when making investment decisions, B&B set out to evaluate both the content and timing of existing annual income numbers. In order to test their assertion, the authors assumed an efficient market, that is, security prices adjust instantaneously to new information, and these price changes reflect the flow of new information to the market. Thus any price changes associated with reported net income would indicate that the annual report does contain new information and, therefore, the income numbers contained therein are useful.

Since incomes of firms have tended to move together, new information contained in reported net income can be approximated by the difference between the actual change in income and its conditional expectation. The expected income change for each firm was estimated first by regressing the change of firm j's income on the change in the average income of all firms in the market using data up to the end of the previous year (r - 1, 2, ..., t-1):[33]

---

[32]Ray Ball and Philip Brown, "An Empirical Evaluation of Accounting Income Numbers," Journal of Accounting Research, Vol. 6 (Autumn, 1968), pp. 159-78.

[33]Ibid., pp. 161-2.

$$\Delta I_{j,\ t-r} = \hat{A}_{1jt} + \hat{A}_{2jt}\ \Delta M_{j,\ t-r} + \hat{U}_{j,\ t-r}. \qquad (2.1)$$

where:

$\hat{A}_{1jt}$, $\hat{A}_{2jt}$ = the estimated regression coefficients.

$\Delta I_{j,\ t-r}$ = the change in firm j's income in past periods.

$\Delta M_{j,\ t-r}$ = the average change in income of all firms (except firm j) in past periods.

Having determined the estimated regression coefficients, the expected income change for firm j in year t is given by substituting the change in the actual average income of all firms in year t (ΔM_{jt}):

$$\hat{\Delta I}_{jt} = \hat{A}_{1jt} + \hat{A}_{2jt}\ \Delta M_{jt}. \qquad (2.2)$$

where:

$\hat{\Delta I}_{jt}$ = expected income change for firm j in year t, given actual average change in incomes of all other firms.

ΔM_{jt} = actual average change in income of all other firms in year t.

The difference between actual change in income and expected change (forecast error) in income is unexpected and therefore contains new information:

$$\hat{U}_{jt} = \Delta I_{jt} - \hat{\Delta I}_{jt}. \qquad (2.3)$$

where:

$\hat{U}_{jt}$ = forecast error.

Since stock prices and rates of return also tend to move together due to the impact of information which affects the entire market, the change in the rate of return of firm j's stock was computed net of market-wide effects. First, a determination of expected return was made by

regressing firm j's actual previous monthly rates of return on an index of actual previous market returns and generating estimated regression coefficients:

$$[PR_{jm}-1] = \hat{b}_{1j} + \hat{b}_{2j}\,[L_m-1] + \hat{V}_{jm}. \qquad (2.4)$$

where:

PR_{jm} = actual previous monthly price relative of security j for month m, defined dividends (djm) + closing price (P_{jm+1}), divided by opening price (P_{jm}).

L_m = link relative of Fisher's "Combination Investment Performance Index." A market price relative.

$\hat{b}_{1j}$, $\hat{b}_{2j}$ = estimated regression coefficients.

$\hat{V}_{jm}$ = stock return residual.

Then the expected return for firm j in month t was calculated:

$$[\hat{PR}_{jt}-1] = b_{1j} + b_{2j}\,[L_t-1]. \qquad (2.5)$$

where:

$\hat{PR}_{jt}$ = expected price relative for firm j in month t, given actual return on market in period t.

L_t = actual return on market in period t.

The difference between actual rate of return and expected rate of return for firm j in period t is the result of new information contained in the income report ($\hat{U}_{jt}$):

$$\hat{V}_{jt} = PR_{jt} - \hat{PR}_{jt}. \qquad (2.6)$$

where:

$\hat{V}_{jt}$ = residual; rate of return attributable to factors unique to firm j and reflected in the annual income report.

If income numbers are useful for making investment decisions, the relationship between $\hat{U}$ and $\hat{V}$ at the annual report announcement date should be such that when $\hat{U}<0$ then $\hat{V}<0$ and conversely when $\hat{U}>0$ then $\hat{V}>0$.

The results of the tests appear to have borne out their hypothesis. Typically, the market reacted in the same direction when actual income differed from expected income. However, it is quite possible that the market reacted to other information which did not conflict with the information contained in the income numbers. The study also provided evidence that most of the information contained in reported income is anticipated by the market and that by the time annual earnings are announced no abnormal returns can be earned, thus providing more evidence in support of the efficient market hypothesis. The study raised several interesting questions and the authors concluded that:

> Of all the information about an individual firm which becomes available during a year, one-half or more is captured in that year's income number. Its content is therefore considerable. However, the annual income report does not rate highly as a timely medium, since most of its content (85 to 90 per cent) is captured by more prompt media which perhaps include interim reports.[34]

SUMMARY

Accounting writers and theorists have stated time and again that accounting information should be useful to the investor. However, as was pointed out in this chapter, theoretical expositions written prior to the 1960's have failed to provide any real guidance to the problems facing the investor. Basic questions, such as "Are investors receiving the

---

[34] Ibid., p. 176.

information they need? If not, can accounting be changed so that it will provide the needed information?"[35] were not even raised in the development of theory structure. It remained for Staubus to push back the frontiers with both theoretical exposition and subsequent empirical investigations based on his theorizing.

The findings of the empirical investigations cited in the chapter indicated that accounting data does have predictive ability. In the Staubus studies, it was shown that alternative earnings variables were associated with common stock values; in the Beaver investigation and the Altman investigation selected financial ratio(s) were able to predict bankruptcy with greater accuracy than by chance alone; and lastly, Ball and Brown were able to demonstrate a relationship between accounting income numbers (at least coincidentally), and rates of return on common stocks.

This present study draws upon many of the theoretical and methodological formulations presented here, particularly those of Staubus. It investigates the usefulness of alternative accounting flow variables in predicting a risk-adjusted rate of return from common stocks by considering the investment decision, accounting inputs to that decision, and the results of that decision.

---

[35] Staubus, A Theory of Accounting to Investors, p. 2.

CHAPTER III

THE RELATIONSHIP BETWEEN ACCOUNTING DATA AND THE INVESTOR'S RATE OF RETURN

Until quite recently accounting theory, as evidenced by the works cited in the previous chapter, was comprised of theoretical expositions which rested on logical propriety and a priori arguments. In the social sciences the validity of theories cannot be tested on a priori grounds. Such theories must be verified by some external method. Empirical tests are an external verification method by which one can examine the ability of a hypothesis to generate operational implications that lead to predictions about observable phenomena.[1]

In this chapter the wealth-maximization criterion of the investor is examined within the contexture of the corporate earnings stream. The mode in which the one stands to the other is delineated, and selected principles of income determination are analyzed from the investor's perspective. The results of theorizing lead to the development of alternative hypotheses which are evaluated in terms of their relative ability to predict the risk-adjusted rate of return earned by investors.

---

[1]The Committee on Accounting Theory Construction and Verification, "Report of the Committee on Accounting Theory and Verification," The Accounting Review, Supplement to Vol. XLVI (1971), p. 77.

THE WEALTH MAXIMIZATION CRITERION

The wealth-maximization criterion is simply another way of stating that individuals seek to maximize utility in the Markowitz sense.[2] Traditionally, utility has been treated as a function of those goods and services that are consumed by individuals. But goods and services are not without cost and require that other property which has a money value, i.e., wealth, be given in consideration thereof. Therefore, utility may be expressed in the form:

$$\text{Utility} = f(\text{Consumption}) = g(\text{Wealth}).$$

In an uncertain world an individual must plan his lifetime consumption pattern in the manner which provides him with the greatest utility. If the individual consumes all of his available wealth each period, there is no planning problem. However, when the individual does not wish to consume all of his wealth each period, but prefers to allocate a portion to future periods, the individual, in essence, becomes an investor. He is willing to postpone present consumption for more consumption in some future period. As an investor he is concerned with the rate of return from his investment because this represents the rate at which his wealth is accumulating. Therefore, the utility equation can be expanded to the form:

$$\text{Utility} = f(\text{Consumption}) = g(\text{Wealth}) = k(\text{Rate of Return}).$$

In situations of uncertainty, where the possibility that the actual rate of return will differ from the expected rate of return, the equation must be modified to take risk into account:

---

[2] The characteristics of an individual seeking to maximize utility in the Markowitz sense are listed in chapter IV.

Utility = k(Expected Rate of Return, Risk).

The consumption-investment tradeoff is typically a multi-period problem. Specification of a sequence of single-period decisions once and for all would rarely be optimal, and neither would it be optimal to simply make a first-period decision that would maximize utility of wealth at the end of that period and disregard investment opportunities in later periods.[3] Any sequence of portfolio decisions are contingent upon the outcomes of previous periods and the probability distributions of expected returns in future periods, and it is only at the beginning of the last period that the investor can make a simple decision to divide his wealth so that he receives the greatest utility that period.[4]

Due to lack of a cogent multi-period theory, Fama, Hakansson and Mossin have assumed that the consumption-investment decision of the investor can be characterized by the single-period model, i.e., the investor will behave in a manner consistent with maximizing the expected value of consumption during the period and terminal wealth at the end of the period, given that the investor has a risk-averse utility function.[5] Since consumption is a function of wealth, Fama has shown that under certain conditions consumption can be ignored, and the investor will act

---

[3] Jan Mossin, "Optimal Multi-Period Portfolio Policies," The Journal of Business, Vol. 41, No. 2 (April, 1968), p. 221.

[4] Ibid.

[5] Eugene Fama, Multi-Period Consumption-Investment Decisions, Report No. 6803 (Chicago: University of Chicago Center for Mathematical Studies in Business and Economics, 1968). Nils H. Hakansson, Optimal Investment and Consumption Strategies for a Class of Utility Functions, Working Paper 101 (Los Angeles, California: Western Management Science Institute, 1966). Jan Mossin, op. cit., pp. 215-29.

in a manner consistent with the wealth-maximization criterion.[6]

THE CORPORATE EARNINGS STREAM

An investor in common stock typically bases his decision on the assumption that the business enterprise will have a perpetual existence, that is, unless there is prima facie evidence to the contrary.[7] He desires to predict the future cash flows accruing to him during and at the termination of a specified holding period. This stream is dependent upon the firm's:

1. future cash receipts and disbursements related to operations;
2. dividend policy; and
3. financial structure.

In a micro-economic setting all of these are interrelated and a function of the firm's portfolio of assets. The future cash receipts and disbursements related to operations are absolutely and unalterably dependent upon the asset portfolio. In turn, both dividend policy and financial structure are a function of the cash flow schedule. All the variables ultimately depend upon the asset portfolio, but examination of this portfolio alone would not yield the information needed by the investor. Rather than attempt to glean all information from this stock of resources, attention is focused on cash receipts and disbursements which spring directly from the assets and which will determine dividend policy, growth and ultimately

---

[6] Eugene Fama, Risk, Return, and Equilibrium, Report No. 6831 (Chicago: University of Chicago Center for Mathematical Studies in Business and Economics, 1968).

[7] R. K. Jaedicke and R. T. Sprouse, Accounting Flows: Income, Funds, and Cash (Englewood Cliffs: Prentice-Hall, Inc., 1965),p. 34.

the cash flow to the investor.

All revenues are surrogates for cash receipts or their equivalent, since cash will be generated immediately upon revenue recognition or at such time when the related receivable matures; and all expenses are surrogates for cash disbursements or their equivalent, since cash will ultimately be expended for the acquisition of services. In accrual accounting it becomes a question of which period will experience the cash flow. Therefore, the measurement of revenue and expense events has relevance to the investor both as an indication of the future dividend stream which can be distributed by the business enterprise without reducing its earning capacity, and in the amount of growth which is impounded in the stock price that can be expected if earnings are retained and reinvested.[8] The importance of the foregoing statement cannot be overstated because it suggests that revenue and expense events affect common stock values and that revenue and expense events, given the going concern assumption, have a strong tendency to recur.[9] Since both of these factors are crucial in predicting future rate of return, the statement of income and expense contains valuable information for the investor. It is postulated in this study that accounting data have predictive ability because accounting data measure the proper events. The events measured are systematically related over time, and as such provide a basis for predicting the trend and variability of future cash flows.

---

[8] Ibid., p. 34.

[9] George J. Staubus, A Theory of Accounting to Investors (Berkeley, California: University of California Press, 1961), p. 95.

The basis for expecting an association between common stock prices and earnings has both theoretical and empirical support in the financial and accounting literature.[10] Virtually all intrinsic value models utilize earnings to determine the value of the firm.[11] Cross sectional studies have provided empirical evidence that the value of the firm is a function of earnings. Modigliani and Miller in a study of the Electric Utility Industry concluded that earnings are the most important explanatory variable of value.[12]

PRINCIPLES OF INCOME DETERMINATION REEXAMINED FROM THE INVESTOR'S PERSPECTIVE

The Service Flow Concept

Assets represent expected future economic benefits.[13] These benefits are transformed into services in order to create the firm's product. The accounting process may be viewed as one of accounting for the flow of services into, within, and out of a business enterprise. The services may be immediate, such as labor which is used as acquired, or the services may

---

[10] An excellent list of empirical research in accounting has been published by Ray Ball, "Index of Empirical Research in Accounting," Journal of Accounting Research, Vol. 9, No. 1 (Spring, 1971), pp. 1-31. The studies which investigated the association between stock prices and earnings are listed under "Income, stock prices and ....", p. 13.

[11] B. Graham, D. L. Dodd and S. Cottle, Security Analysis, Principles and Techniques;(4th ed. New York: McGraw-Hill Book Co., 1962).

[12] F. Modigliani and M. Miller, "Some Estimates of the Cost of Capital to the Electric Utility Industry," The American Economic Review (June, 1966), pp. 333-391.

[13] R. Sprouse and M. Moonitz, A Tentative Set of Broad Accounting Principles for Business Enterprises, Accounting Research Study No. 3 (New York: American Institute of Certified Public Accountants, 1962), p. 20.

attach to a physical object and flow with it, such as materials; and finally, services may be acquired in bundles, such as machinery, where services flow from the bundle without physical change in the asset.[14] The service activity creates the product as the services flow into the new product. However, in the real world, the optimal relationship between service inputs and product is difficult and in some cases impossible to specify.

The theoretical propriety of attempting to match services flowing from all the assets to the product created is unquestionable since all of the assets endeavor to generate revenues and all costs must be recovered if the enterprise is to remain in existence. However, accrual accounting sacrifices some degree of preciseness in measurement.[15] For those services where the inflow-outflow relationships are readily discernible, present accounting practices accurately portray the underlying economic events. But the income statement also incorporates other inflow-outflow relationships, which are recurring, but which are more troublesome to the accountant because these relationships are not so easily susceptible to identification and measurement. This is particularly true of the relationship between services flowing with inventory and product, and services flowing from fixed assets and product.

Evaluation of Selected Principles of Income Determination

The traditional income statement combines all service activities on a functional basis and deducts them from revenues to arrive at net

---

[14]Norton Bedford, Modern Accounting (New York: The Ronald Press Co., 1968), p. 237.

[15]Jaedicke and Sprouse, op. cit., p. 38.

income. The assets from which these services stem are measured by several techniques. Net monetary assets are measured at face value, discounted value of future money movements, and net realizable value.[16] Short-term non-monetary assets are generally measured at historical cost, although under certain conditions inventory is measured at market (lower of cost or market). Fixed assets are measured at historical cost. Accounting for immediate services stemming from net monetary assets is on a current basis; for example, the services flowing from direct labor are consumed immediately and renumeration is current. Accounting for services attached to the physical flow of inventory is not quite as clear-cut because of inherent weaknesses in the measurement of cost of goods sold and ending balances. These weaknesses exist partly because of the present practice of adhering to historical cost, and partly because of the principles governing allocation between asset and expense.

Inventory accounting is dual aspectual. First, in ranked importance, according to the American Institute of Certified Public Accountants, is to develop charges properly applicable to current revenue in order to clearly reflect periodic income. And secondly, to report on the balance sheet a value properly chargeable to future revenues.

> A major objective of accounting for inventories is the proper determination of income through the process of matching appropriate costs against revenues ...the major objective in selecting a method should be to choose the one which, under the circumstances, most clearly reflects periodic income.

---

[16] G. J. Staubus, "The Association of Financial Accounting Variables with Common Stock Values," The Accounting Review, Vol. XL, No. 1 (January, 1965), p. 119.

> In accounting for the goods in the inventory at any point of time, the major objective is the matching of appropriate costs against revenues in order that there may be a proper determination of the realized income. Thus, the inventory at any given date is the balance of costs applicable to goods on hand remaining after the matching of absorbed costs with concurrent revenues. This balance is appropriately carried to future periods provided it does not exceed an amount properly chargeable against the revenues expected to be obtained from ultimate disposition of the goods carried forward.[17]

The most widely used inventory costing methods during the 1960-1970 period were first-in, first-out, weighted average, and last-in, first-out.[18] In an economic environment where prices paid for merchandise do not fluctuate significantly, differences among methods are comparatively minor. However, in a period of fluctuating prices, such as those experienced between 1960-1970, the alternative inventory methods provided relatively material differences on financial statements and the limitations of each method weighed heavily.

Those companies using Fifo matched rising sales prices with

---

[17] Committee on Accounting Procedure and Accounting Terminology. Accounting Research and Terminology Bulletin (Final Edition; New York: American Institute of Certified Public Accountants, 1961), pp. 28-29.

[18] Based on a sample of 600 companies, the following cost methods were those most frequently used for reporting purposes.

Year	Cost Method		
	Fifo	Wtd. Average	Lifo
1970	292	203	146
1965	213	176	191
1960	182	157	196

These statistics are found in the following publications: American Institute of Certified Public Accountants, Accounting Trends and Techniques (25th ed.; New York: American Institute of Certified Public Accountants, 1971), p. 61. _____, Accounting Trends and Techniques (18th ed.; New York: American Institute of Certified Public Accountants, 1964), p. 46.

oldest low costing inventory, resulting in higher gross profit and higher taxes. Reported earnings were not available to owners because of the increased costs which would be incurred to replenish the gap in inventory resulting from sales. Furthermore, the objectives of matching current costs with current revenues and the separate reporting of gains and losses from price changes are not generally met with the first-in, first-out inventory procedure.[19] Those companies using weighted average methods obtained results similar to what would have been shown had Fifo been used.[20] Similarly, average costs do not reflect either the matching of current costs with current revenues or balance sheet valuations in terms of current costs because they perpetually contain to some minor degree, the influence of earliest costs and inventory values that may lag significantly behind current prices in periods of rising or falling prices.[21]

Lifo and the various accelerated depreciation methods are accepted today because of tax regulations and are applied indiscriminantly in many instances without regard to their theoretical propriety.[22] The theoretical objections to the use of last-in, first-out are manifold. Perhaps the most salient objection to the use of Lifo is the value assigned to ending inventory. This value can rarely be current in periods of fluctuating prices and as such, financial ratios based on balance

---

[19] Eldon S. Hendriksen, Accounting Theory (Revised edition; Homewood: Richard D. Irwin, Inc., 1970), p. 340.

[20] Harry Simons, Intermediate Accounting, Comprehensive volume (5th edition; Cincinnati: South-Western Publishing Co., 1972), p. 261.

[21] Ibid., p. 263.

[22] R. F. Salmonson. Basic Financial Accounting Theory (Belmont: Wadsworth Publishing Company, Inc., 1969), p. 26.

sheet inventory figures are frequently meaningless. However, since this research focuses on the relative usefulness of alternative income flow measures, the remaining objections to Lifo attack the method from the standpoint of income determination.

First, Lifo is not a sound measurement method. It does not measure what actually took place since it is dramatically opposed to the usual flow of goods. Such a practice obscures measurements and contradicts the aims of accounting to report financial activities fairly.[23]

Secondly, Lifo tends to smooth income. This results in a relatively stable gross profit percentages, despite fluctuating prices. Artificial smoothing is undesirable. If the results of operations are not, in fact, smooth, accounting methods should not allow them to appear as though they were.[24]

Thirdly, when inventory is reduced below normal quantities, the matching of ancient costs with current revenues produces absurd results.[25] Furthermore, the fear of liquidation of Lifo inventory and the tax consequences have led to irrational buying policies, particularly at year end.[26]

Fourthly, as a method of solving the price-level problem,

---

[23] Simons, op. cit., p. 265.

[24] Hendriksen, op. cit., p. 345.

[25] Ibid., p. 344.

[26] Ibid., citing Waino W. Suojanen, "Lifo as a Spur to Inflation - The Recent Experience of Cooper." The Accounting Review, Vol. XXXII (January, 1957), pp. 42-50.

Lifo is incomplete and it permits a deferral in recognition of gains and losses from the holding of inventories while specific prices are changing at a rate which differs from that of prices in general.[27]

Lastly, the application of Lifo simply tends to understate net income.[28]

Based on the aforementioned objections, there is a question of whether the addition of inventory-cost-of-sales accounting improves upon flow measurements of the success of business activities.[29]

Accounting for services stemming from fixed assets is the most questionable of all. The American Institute of Certified Public Accountants' Committee on Terminology formulated the following definition and comments:

> Depreciation accounting is a system of accounting which aims to distribute the cost or other basic values of tangible capital assets, less salvage (if any), over the estimated useful life of the unit (which may be a group of assets) in a systematic and rational manner. It is a process of allocation, not of valuation. Depreciation for the year is the portion of the total charge under such a system that is allocated to the year. Although the allocation may properly take into account occurences during the year, it is not intended to be a measurement of the effect of all such occurences.[30]

Depreciation can be considered: a) a fall in price, b) a measure of using up, c) a fall in value, d) a process of cost allocation.[31]

---

[27] Ibid., p. 343.

[28] Salmonson, op. cit., p. 57.

[29] G. J. Staubus, "Testing Inventory Accounting," The Accounting Review, Vol. XLIII, No. 3 (July, 1968), p. 414.

[30] Committee on Accounting Procedure and Accounting Terminology, op. cit., p. 25.

[31] Louis Goldberg, Concepts of Depreciation (Melbourne: Harston Patridge and Company, 1960), p. 9.

The American Institute has considered it desirable to emphasize the cost allocation concept as the primary, if not the sole meaning of the term. The arbitrary selection of the cost allocation concept rests upon, among other things, the heroic assumption concerning the stability of the monetary unit. Periodic depreciation then is merely a slice of cost charged against revenues during the same period, thus allowing the company to recover the dollars originally expended at the time the asset was acquired. But all allocation methods, and therefore depreciation must rest upon concepts of service flows stemming from fixed assets over time or else the allocation is arbitrary and meaningless as a concept of net income.[32]

The American Accounting Association Committee on Concepts and Standards views depreciation differently from the American Institute of Certified Public Accountants:

> Assets are economic resources devoted to business purposes with a specific accounting entity; they are aggregates of service potentials available for, or beneficial to, expected operations. The notion of "service potentials" provides a sound conceptual basis for asset valuation...Measurement of service potential may be attained by reference to the current cost of securing the same or equivalent services...
>
> Depreciation reflects the estimated expiration of service potential of the assets...Income from ordinary operations should represent an amount in current dollars, which, in the absence of catastrophic loss or discovery of assets, is available for distribution outside the firm without contraction of the level of its operating capacity...Measurement of this concept of income from ordinary operations can be accomplished

---

[32] Arthur L. Thomas, The Allocation Problem in Financial Accounting Theory, Studies in Accounting Research, No. 3 (Evanston: American Accounting Association, 1969), p. 29.

> only if the expiration of service potential is measured in terms of current cost. That is, in order to continue operations without contracting the level of operating capacity, exhausted services must be restored; the relevant cost of expired services is the current cost of restorations.[33]

Valuations in terms of current cost emphasizes future service potential as opposed to the deferred expense approach which treats depreciation as the writeoff of a sunk cost.

The American Institute in its pronouncement has explicitly stated that inflation has not proceeded far enough in the United States to cause the original costs of fixed assets to lose their significance for purposes of determining net income.[34] The American Accounting Association and the proponents of price level change believe quite the opposite and argue that failure to recognize current price levels in the measurement of depreciation costs results in a serious overstatement of net income for those companies having substantial fixed capital investments, and furthermore, that this overstatement of net income is in itself an important contributing factor to inflation since it stimulates demands for wage increases in excess of labor's share of the greater productivity arising from technological improvements.[35]

The major thrust of the attack on present depreciation practices is directed at the poor valuation methods of fixed assets and the lack

---

[33] Committee on Concepts and Standards - Long-Lived Assets, "Accounting for Land, Buildings and Equipment." Supplementary Statement No. 1, Accounting Review, Vol. XXXIX (July, 1964), p. 696.

[34] Committee on Accounting Procedure and Accounting Terminology, op. cit., p. 69.

[35] Paul Grady, "Depreciation - To Measure Income or Provide Funds for Replacement?" N.A.A. Bulletin, Vol. 40 (August, 1959), pp. 58-59.

of an explicit attempt to measure the flow of services stemming from those assets. The weaknesses in depreciation accounting can be summarized as follows:

1. Poor valuations of fixed assets.
2. Inaccuracies in the estimates of service lives, patterns of service flows, patterns and levels of post-acquisition costs of obtaining assets' services, and salvage values; and
3. lack of uniformity among firms.[36]

Since these criticisms are considered non-trivial, there appears to be little justification for the inclusion of depreciation expense, as currently computed, in the determination of net income.

ALTERNATIVE EARNINGS FLOW VARIABLES VIEWED AS COMPETING HYPOTHESES

The foregoing analysis demonstrates that present accounting practice contains three major deficiencies:

1. The inclusion of nonrecurring items in the computation of net income;
2. Inaccurate measurement of services flowing from fixed assets; and
3. Arbitrary allocations of inventory costs between asset and expense.

The deficiencies suggest that substitution of purchases for cost of goods

---

[36] G. J. Staubus. "Statistical Evidence of the Value of Depreciation Accounting," Abacus, Vol. 3, No. 1 (August, 1967), pp. 12-13.

sold, non-consideration of depreciation, and the elimination of nonrecurring items would improve the usefulness (i.e., ability to predict future market performance) of the income flow variable.

In order to test these assertions, flow variables consistent with generally accepted accounting principles are compared with non-accepted alternatives in the form of competing hypotheses. Two sets of tests are performed. As stated in chapter I the first set of tests will examine the possibility of the existence of a lagged relationship between the accounting flow variables and the risk-adjusted rate of return. The second set of tests will examine the extent of contemporaneous association. The results of these sets of tests will provide evidence concerning the relative future predictive ability of accounting flow data and it's ability to substantiate equilibrium market prices. The results of testing the relationship between the accounting flow variables and the risk-adjusted rate of return in both concurrent time periods and future time periods will also furnish concrete evidence concerning the efficiency with which the market reacts to the accounting data.

The first variable, defined in accordance with the recommendations of APB No. 9,[37] is Net Income Available to Common Stockholders. This will serve essentially as a benchmark against which the other variables will be compared. The computation of Net Income Available to Common Stockholders is:

Net Income

Deduct Preferred Dividends

Net Income Available to Common Stockholders (EA)

---

[37] Accounting Principles Board, Reporting the Results of Operations, Opinion No. 9 (New York: American Institute of Certified Public Accountants, December, 1966).

This variable is the net effect of all of the measures of service flows as well as nonrecurring items. Typically, investors in common stock rely heavily on this flow variable because it is the most comprehensive single figure stemming from operations concerning changes in equity over time. Conceptually, this all-inclusive figure endeavors to capture the essence of the firm's operating activities. However, the foregoing analysis led to the conclusion that the presence of service flows deriving from inventories and fixed assets will limit the usefulness of Net Income Available to Common Stockholders (EA) because of accounting deficiencies in those areas. In addition, if nonrecurring items exist and are substantive, the predictive ability of the variable will be significantly lessened.

The second variable is Net Recurring Income. The abbreviation ER will be used to connote earnings including only recurring items. The computation of ER is:

Net Income Available to Common Stockholders (EA)

Deduct Nonrecurring Items

Net Recurring Income (ER)

The elimination of nonrecurring items of course distorts what actually transpired, but since it has been postulated that recurring events are of utmost importance to investors in common stock, this variable's predictive ability may be limited only to the extent that inaccurate measurement of expenses stemming from nonmonetary assets exist. If, as seems likely, ER has greater predictive ability for investors in common stock than EA, the requirement contained in APB No. 9 that nonrecurring items be included in the computation of net income would appear to be a grievous

error. Thus, the first hypothesis to be tested is:

> H_1: Net Income Available to Common Stockholders (EA) is more useful to investors in common stock than Net Recurring Income (ER) for predicting the risk-adjusted rate of return.

The third variable, Current Recurring Flow, is a crude approximation of net working capital provided by operations. The abbreviation CR will be used and it is computed as follows:

Net Recurring Income (ER)

Add Depreciation and Amortization

Current Recurring Flow (CR)

Describing this flow as net working capital provided by operations is somewhat inaccurate since nonrecurring items are excluded.[38] If the results of the tests to be performed indicate that Current Recurring Flow has greater predictive ability for investors in common stock than the two preceding variables, it will be concluded that depreciation accounting makes no useful contribution to the resolution of the investor's problem. Thus, the second hypothesis is:

> H_2: Net Income Available to Common Stockholders (EA) or Net Recurring Income (ER) is more useful to investors in common stock than Current Recurring Flow (CR) for predicting the risk-adjusted rate of return.

The fourth and last variable, Net Recurring Income less Changes in Inventories, abbreviated ER-ΔI, is computed as follows:

Net Recurring Income (ER)

Add Decreases in Ending Inventory

Deduct Increases in Ending Inventory

Net Recurring Income less Changes in Inventories (ER-ΔI)

---

[38] For a discussion of current flow see, Accounting Principles Board, Reporting Changes in Financial Position, Opinion No. 19 (New York: American Institute of Certified Public Accountants, March, 1971), pp. 373-5.

The resulting flow measure includes only recurring items and depreciation but is not dependent on inventory accounting. Instead, purchases are substituted for cost-of-sales, since if beginning inventory equals ending inventory, then purchases equal cost-of-sales.[39] If the results of the tests to be performed indicate that Net Recurring Income less Changes in Inventories has greater predictive ability for investors in common stock than Net Income or Net Recurring Income (variables EA and ER), it will be concluded that inventory-cost-of-sales accounting makes no useful contribution to the resolution of the investor's decision problem. Thus, the third hypothesis is:

> H_3: Net Income Available to Common Stockholders (EA) or Net Recurring Income (ER) is more useful to investors in common stock than Net Recurring Income less Changes in Inventories (ER-ΔI) for predicting the risk-adjusted rate of return.

SUMMARY

The rate of return stemming from common stock investments is of prime concern to investors in those stocks. The relationship between the rate of return and the corporate earnings stream is direct and inevitable. Future dividends and future market prices of common stock shares are impounded in the rate of return formulation, and are a function of earnings, present and future. Earnings are the net effect of revenues, which are surrogate for cash receipts and of expenses, which are surrogates for cash disbursements. Therefore, the measurement of revenue and expense

---

[39] Staubus, "Testing Inventory Accounting," p. 415.

events is relevant to the common stock investor as an indication of the future cash flows to be derived from operations and ultimately accruing to him in the form of dividends.

In this study it is postulated that accounting data have predictive ability because accounting data measure the proper events. The events measured (revenue and expense) are systematically related over time and as such provide a basis for predicting the trend and variability of future cash flows. However, accrual accounting may suffer from inherent limitations which hinder its ability to measure precisely the services flowing from utilization of nonmonetary assets. Furthermore, the inclusion of nonrecurring items in the computation of net income may obscure the trend and variability of future cash flows. Therefore, alternative flow measures have been designed to eliminate the weaknesses inherent in depreciation accounting, inventory accounting and the inclusion of non-recurring items. The alternative flow measures will be evaluated in terms of their relative ability to predict the risk-adjusted rate of return from common stocks.

CHAPTER IV

THE EXPECTATION MODEL - THE VARIABLE TO BE PREDICTED

Investors are interested in predicting the rates of return which can be obtained from various common stock investments, where rate of return = $\frac{\text{capital gains plus dividends for the holding period}}{\text{beginning price}}$. But predicted rate of return is not a sufficient basis for choice because the future is uncertain. Since all securities are characterized by risk as well as expected return, where the term risk implies the possibility that actual returns may vary from expected returns, the rate of return on a common stock must be adjusted in some manner to reflect risk.[1] The most common measures of risk for individual securities are the standard deviation of past earnings per share from a trend line, the variance of rate of return on shareholder capital, and the debt/equity ratio.[2]

The purpose of this chapter is to develop an expectational model which considers both the risk and return parameters of common stock investments. The model rests heavily on recent theoretical developments from the field of finance, particularly portfolio analysis and market-line theory.

---

[1] A. Robichek, "Risk and the Value of Securities," Journal of Financial and Quantitative Analysis, Vol. IV, No. 4 (December, 1969), p. 515.

[2] Ibid., p. 531.

THE EXPECTED UTILITY MAXIM

Individuals frequently must, or can, choose among alternatives that differ, among other things, in the degree of risk to which the individual will be subject.[3] The notion that choices among alternatives involving risk can be explained by maximizing expected utility is not new. As far back as 1738, Bernoulli, in his classic paper on probability, the "St. Petersburg Paradox," considered using the mathematical expectation of utility to compare alternatives involving risk.[4] Subsequently, the theory was rejected by Marshall and others as being "unrealistic." But Friedman and Savage have pointed out that the rejection was premature because there was "a failure to appreciate the real generality of the kinds of behavior explicable by the maximization of expected utility," namely that expected utility is not the same as the utility of expected income.[5] In a rather abstruse fashion Bernoulli was purporting to say that expected utility is not merely a function of expected income, but is dependent on other parameters as well.

The neoclassical economists measured utility cardinally. The cardinal utility measure was designed to convey information about the

---

[3]Milton Friedman and Leonard J. Savage, "The Utility Analysis of Choice Involving Risk," The Journal of Political Economy, Vol. LVI, No. 4 (August, 1948), pp. 279-304. Reprinted in E. Bruce Frederickson, Frontiers of Investment Analysis (2d ed.; Scranton: International Textbook Company, 1971), p. 13.

[4]Daniel Bernoulli, "Exposition of a New Theory on the Measurement of Risk," Econometrica, Vol. XXII (1954), pp. 23-36, translated by Dr. L. Sommer from "Specimen Theoriae Novae de Mensura Sortis," Commentarii Academiae Scientiarum Imperialis Petropolitanae, Vol. V.

[5]Friedman and Savage, op. cit., p. 16.

psychological state of an individual, the magnitude of his desires, and the psychic gains and losses incurred by the alternative actions available to him.[6] Many economists found both the necessity to quantify utility and the assumption of diminishing marginal utility aspects of the theory distasteful because of their apparent lack of realism.[7] An alternative mode of analysis was available in the theory of indifference curves first introduced late in the nineteenth century by Francis Y. Edgeworth[8] and later (1930's) refined and popularized by Hicks and Allen.[9] The analysis eliminated the need for quantifying utility by simply ranking an individual's combinations of preferences ordinally.

It remained for the game theorists to extend the technique of indifference curve analysis. In the course of their work on game theory, von Neumann and Morgenstern[10] were led to construct their cardinal utility measure for the ranking of situations involving probabilities (risky situations).[11] This stimulated the theory of rational choice under uncertainty by asserting the maxim of expected utility as a guide to action.

---

[6]William J. Baumol, Economic Theory and Operations Analysis (2d ed.; Englewood Cliffs: Prentice-Hall, Inc., 1965), p. 512.

[7]Richard H. Leftwich, The Price System and Resource Allocation (3d ed.; New York: Holt, Rinehart and Winston, Inc., 1966), p. 66.

[8]Francis Y. Edgeworth, Mathematical Psychics (London: C. K. Paul & Co., 1881).

[9]John R. Hicks and R. G. D. Allen, "A Reconsideration of the Theory of Value," Economica (February, May, 1934), pp. 52-76, 196-219.

[10]John von Neumann and Oskar Morgenstern, Theory of Games and Economic Behavior (2d ed.; Princeton: Princeton University Press, 1947).

[11]Baumol, op. cit., p. 513.

Accordingly, the theory posits that a rational man[12] facing a set of alternative actions, the outcomes of which are subject to probability distributions, will act consistent with the expected utility maxim.[13] The maxim, while similar to Bernoulli's definition of expected utility (which purported to convey information about the individual's psychic state), avoids the philosophical, introspective and psychological interpretation of the varying willingness to take risks and simply states that the individual should act as if:

(1) he attaches numbers, called their utility, to each possible outcome, and

(2) when faced with chance alternatives he selects the one with the greatest expected value of utility.[14]

Most of the work in portfolio theory has assumed that the utility function of an investor exhibits a quadratic form.[15] Typically, the

---

[12] Markowitz defines a rational man as one who makes no errors in arithmetic or logic in attempting to achieve his clearly defined objectives. He is neither omnipotent nor omniscient and must make decisions in the face of uncertainty. Since his information is limited, he may take less than perfect actions. Every action, however, is perfectly thought out; every risk is perfectly calculated. Harry M. Markowitz, Cowles Foundation Monograph No. 16, Portfolio Selection: Efficient Diversification of Investments (New York: John Wiley & Sons, 1959), p. 206.

[13] Michael C. Jensen, "Risk, the Pricing of Capital Assets, and the Evaluation of Investment Portfolios," The Journal of Business of the University of Chicago, Vol. 42, No. 2 (April, 1969), pp. 167-185, 192-202, 241-247. Reprinted in abridged form in E. Bruce Frederikson, op. cit., pp. 192-193.

[14] Markowitz, op. cit., p. 208. In addition to the expected utility maxim, Markowitz also discusses the axiomatic approach, where axioms are offered as basic principles of rational behavior, and demonstrates that the expected utility maxim follows from these principles. These are the assumptions upon which utility analysis is based. Chap. X.

[15] Jan Mossin, "Optimal Multiperiod Portfolio Policies," The Journal of Business of the University of Chicago, Vol. 41, No. 2 (April, 1968), p. 217.

function is a positively sloped curved line which is concave downward (given that utility is measured on the Y axis and that "things" which provide utility are measured on the X axis).

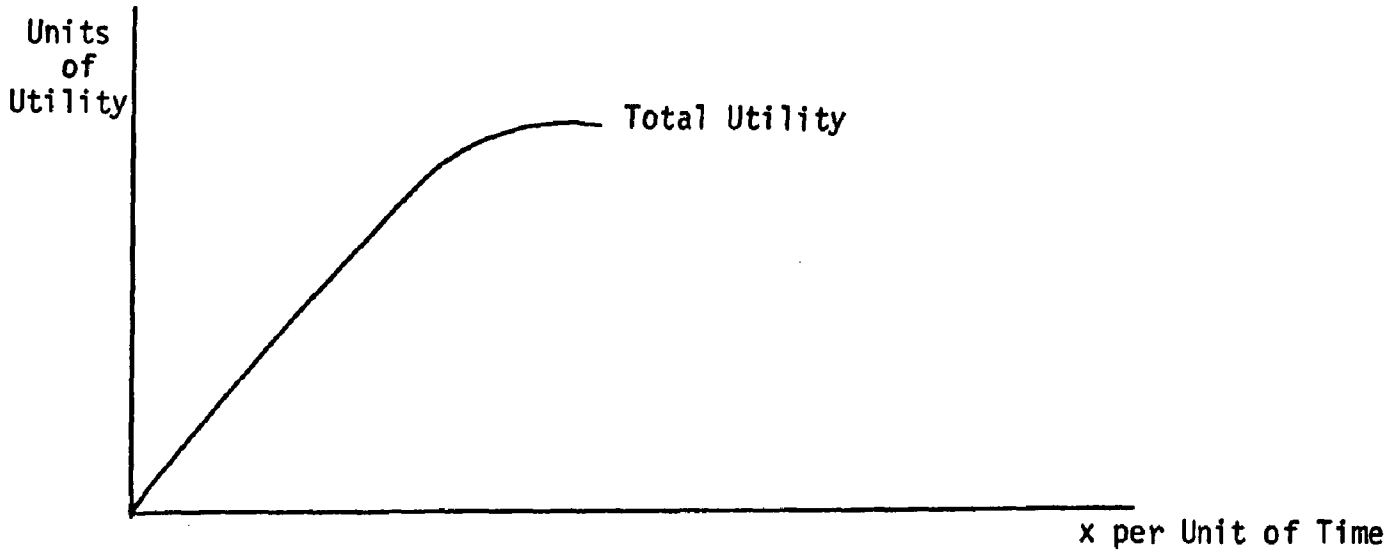

FIGURE 4.1

QUADRATIC FORM OF INVESTOR UTILITY FUNCTION

In economic analysis, utility has been considered to be a function of wealth, and since rate of return is a measure of the rate at which wealth is accumulated, the utility from investment activity can be restated as a function of the rate of return on invested wealth.[16] However, under conditions of uncertainty an investor must generate probability distributions of expected returns for each alternative investment opportunity available to him. Markowitz has asserted that the parameters of interest to the investor in determining his utility function are the first moment about zero (mean) and the second moment about the mean (variance).[17] Empirical evidence on the precise nature of the probability distributions of security returns ex post

---

[16] Jack C. Francis and Stephen H. Archer, Portfolio Analysis (Englewood Cliffs: Prentice-Hall, Inc., 1971), p. 17.

[17] Markowitz, op. cit., p. 286.

indicates that the distributions of returns on common stocks and bonds seem to conform to the members of the Stable class of distributions, for which the mean exists but the variance does not.[18] Fama, however, pointed out that finite variances can be assumed.[19]

There is no inevitable connection between the validity of the expected utility maxim and the validity of portfolio analysis based on expected return and variance.[20] But Tobin postulated that if utility is a function of expected return and variability of return or any other pair of independent parameters describing the investor's probability distribution, then the shape of his indifference curves can be inferred from the general characteristics of his utility-of-return function.[21] Specifically, he demonstrated that all risk-averters are diversifiers and that a risk-averter's indifference curve is necessarily concave upwards (risk on the horizontal axis and return on the vertical axis), provided the curve is derived from a two-parameter family of probability distributions and reflects declining marginal utility of return.[22]

---

[18] Jensen, op. cit., pp. 194-195: citing evidence published by the following authors. Benoit Mandelbrot, "The Variation of Certain Speculative Prices," Journal of Business, Vol. XXXVI (October, 1963), pp. 394-419. Eugene Fama, "The Behavior of Stock Market Prices," Journal of Business, Vol. XXXVII (January, 1965), pp. 34-105. Richard Roll, "The Efficient Market Model Applied to U.S. Treasury Bill Rates," (unpublished Ph.D. dissertation, University of Chicago, 1968).

[19] Eugene Fama, "Portfolio Analysis in a Stable Paretian Market," Management Science, Vol. XI (January, 1965), pp. 404-19.

[20] Markowitz, op. cit., p. 209.

[21] J. Tobin, "Liquidity Preference as Behavior Toward Risk," Review of Economic Studies, Vol. XXV (2), No. 67 (February, 1958), p. 74.

[22] Tobin was investigating liquidity preference in risk situations and the allocation of wealth between cash and consols. However, the theoretical constructs developed here can be applied to the wider range of problems facing the investor.

In the expected risk (σR) - expected return (ER) plane (shown below) Tobin portrayed the optimum portfolio of cash and consols.

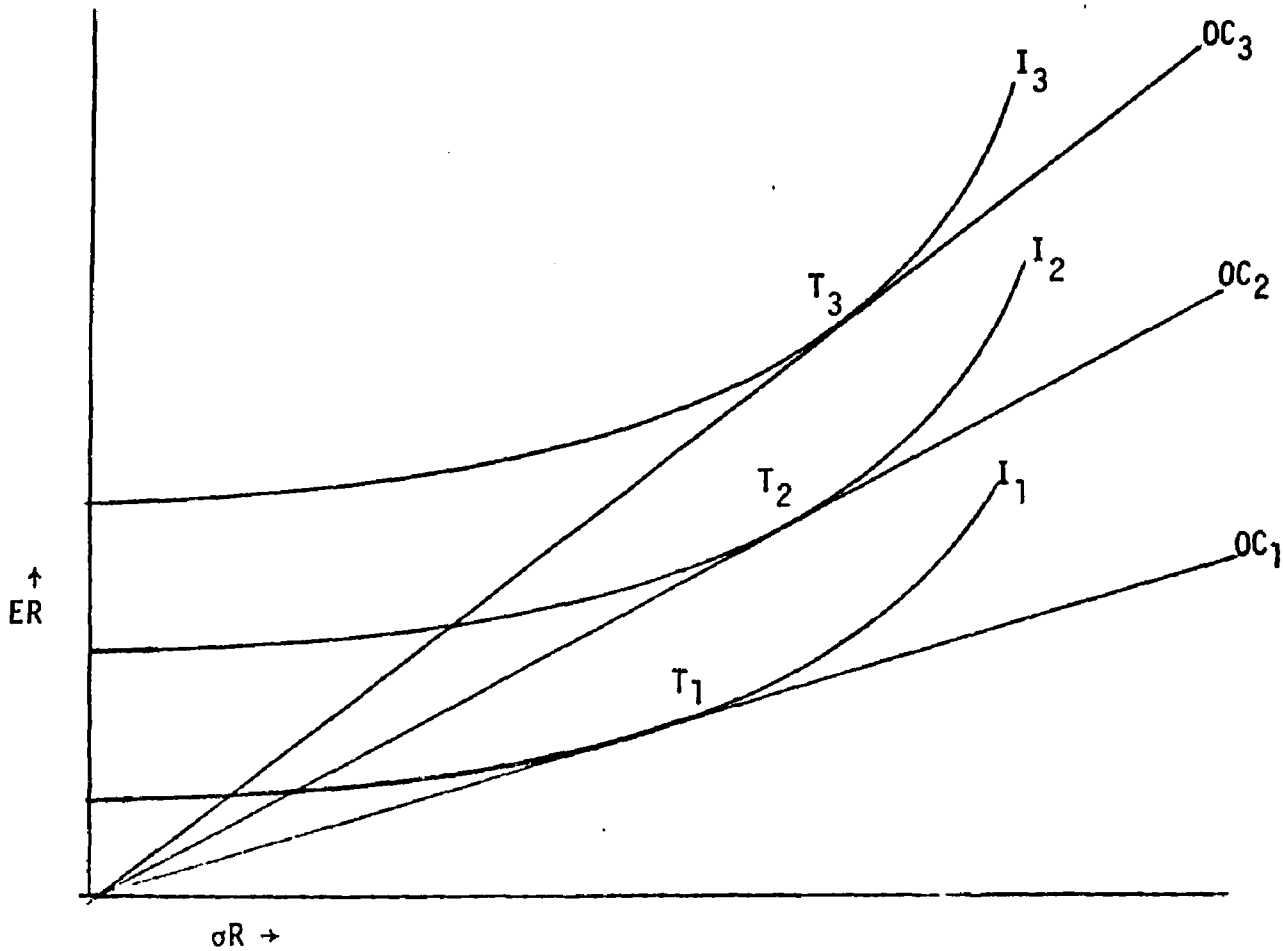

FIGURE 4.2

PORTFOLIO SELECTION AT VARIOUS RATES OF INTEREST[23]

1. The rays OC_1, OC_2, OC_3 represent opportunity loci for various rates of interest. The slope of the ray is dependent upon the rate of interest. The slope of ray OC_3 is based on a higher interest rate than the slope of ray OC_2 which in turn is based on a higher interest rate than OC_1.

2. Indifference curves I_1, I_2, I_3 represent the investor's field of indifference curves. The investor is assumed to have preferences between

---

[23]Tobin, op. cit., p. 73.

expected return (ER) and risk (σR), and each indifference curve is a locus of points (ER, σR) along which expected utility is constant. Points on I_2 are preferred to those on I_1; for a given level of risk, an investor always prefers a greater to a smaller expectation of return.

3. Points T_1, T_2, T_3 represent tangencies. The tangencies illustrate the combination of cash and consol that will satisfy the expected utility maxim, given the opportunity locus.

From the figure it can be seen that an investor who places all of his resources in cash earns no returns and bears no risks. However, by allocating a portion of his resources in consols and the remainder in cash, he can earn expected return and bear the concomitant risk at any level designated by the opportunity locus OC_1. The exact allocation between cash and consols will be specified by the tangency between the opportunity locus and the highest indifference curve. Since Tobin has shown that the family of indifference curves of risk-averters are positively sloping convex curves in the return-risk plane, that tangency will be at a point where the portfolio is diversified. This is the optimum portfolio. This is the portfolio that offers minimum risk (σR) for a given level of expected return (ER) and maximum expected return for a given level of risk if the investor's utility function is a quadratic function, and the distributions of asset and portfolio returns are completely described by two parameters.[24]

---

[24]Jensen, op. cit., p. 195.

EFFICIENT PORTFOLIOS

In order to deal with the risk-return phenomenon effectively, Markowitz pointed out that investors invest in portfolios and that the risk of any individual security depends upon how much risk the inclusion of that security adds to the portfolio.[25] Markowitz-efficient diversification involves combining investments whose returns have less than perfect positive correlation in order to reduce risk in the portfolio, without sacrificing any of the portfolio's expected return.[26]

The assumptions upon which portfolio analysis rests are:

1. All investors maximize one-period expected utility and exhibit diminishing marginal utility of wealth. This implies that they visualize each investment opportunity as being represented by a probability distribution of additions to their terminal wealth. Or, equivalently, all investors visualize assets as probability distributions of expected returns over some holding period.

2. Investors' risk estimates are proportional to the variability of the expected returns.

3. Investors are willing to base their decisions solely in terms of expected return and risk. That is, utility (U) is a function of variability of return (σ) and expected return [E(r)]. Symbolically, $U = f[\sigma, E(r)]$.

4. For any given level of risk, investors prefer higher returns to lower returns. Or, conversely, for any given level of rate of return, investors prefer less risk over more risk.[27]

---

[25]Harry M. Markowitz, "Portfolio Selection," Journal of Finance, Vol. VII, No. 1 (March, 1952), p. 77.

[26]Francis and Archer, op. cit., p. 23.

[27]Ibid., p. 7.

Graphically, the opportunity set of the Markowitz expected return-variability of expected return model is shown in Figure 4.3

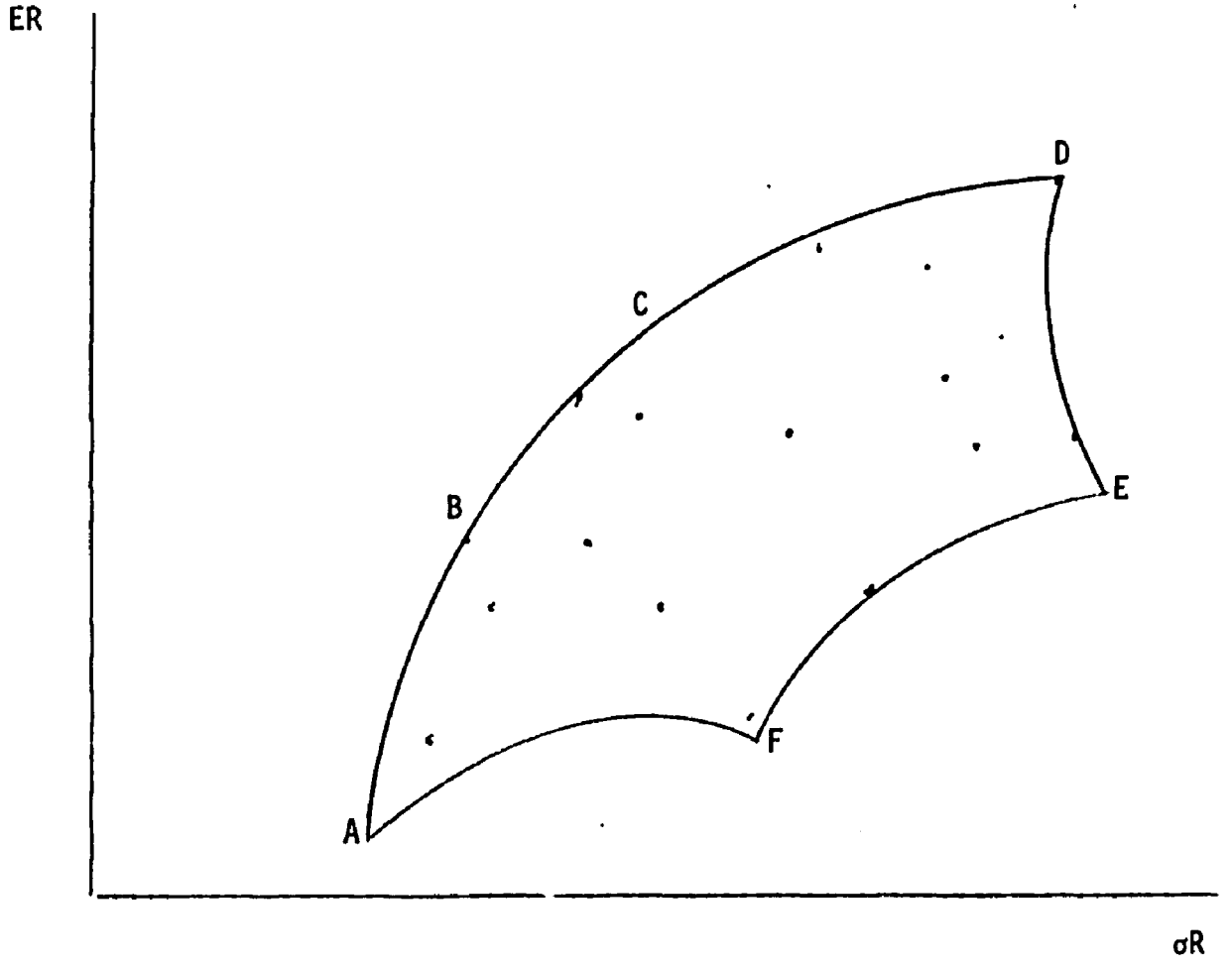

FIGURE 4.3

MARKOWITZ OPPORTUNITY SET

The dots in figure ABCDEF show all the possible combinations of risk and return available to an investor by investing in risky securities. The curvilinear set ABCDEF simply delineates the perimeter of the possible combinations. All points within this opportunity set are feasible for investment, but a Markowitz-efficient investor will select only those combinations which lie on the efficient frontier ABCD, given the assumptions above. The efficient frontier takes its shape because of the covariance

between securities.[28] The exposition of the curvature of the efficient frontier that follows is based on the one given by Sharpe.[29]

Assume an investor is considering a portfolio (p) of two securities A and B. The significant parameters he must consider (according to Markowitz) are expected return (ER), variance of expected return (σR) and covariance of expected returns between securities (σR_{AB}). The expected return of the portfolio is given as:

$$E(R_p) = W_A(ER_A) + W_B(ER_B) \tag{4.1}$$

where:

W_A represents the proportion of the individual's wealth allocated to security A, and W_B the proportion to security B.

The variance of expected returns of the portfolio are expressed as:

$$\sigma^2(R_p) = (W_A)^2(\sigma R_A)^2 + (W_B)^2(\sigma R_B)^2 + 2W_AW_B(\rho_{AB}\sigma R_A\sigma R_B) \tag{4.2}$$

where:

$(\rho_{AB}\sigma R_A\sigma R_B)$ = covariance: a measure of the way A and B vary together and its value may be either positive, zero or negative, and

(ρ_{AB}) = the coefficient of correlation: a measure of the degree of relation between A and B.[30]

---

[28]Jack Hirschleifer, "Efficient Allocation of Capital in an Uncertain World," American Economic Review (May, 1964), p. 79.

[29]William F. Sharpe, "Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk," The Journal of Finance, Vol. XIX, No. 3 (September, 1964), p. 430.

[30]Roger L. Burford, Statistics: A Computer Approach (Columbus: Charles E. Merrill Publishing Co., 1968), p. 290.

If the coefficient of correlation between the predicted rates of return of both securities is +1 (perfect positive correlation), then the variance of expected returns of the portfolio ($\sigma^2 R_p$) would be greater than if the coefficient of correlation were < +1. This is depicted in Figure 4.4:

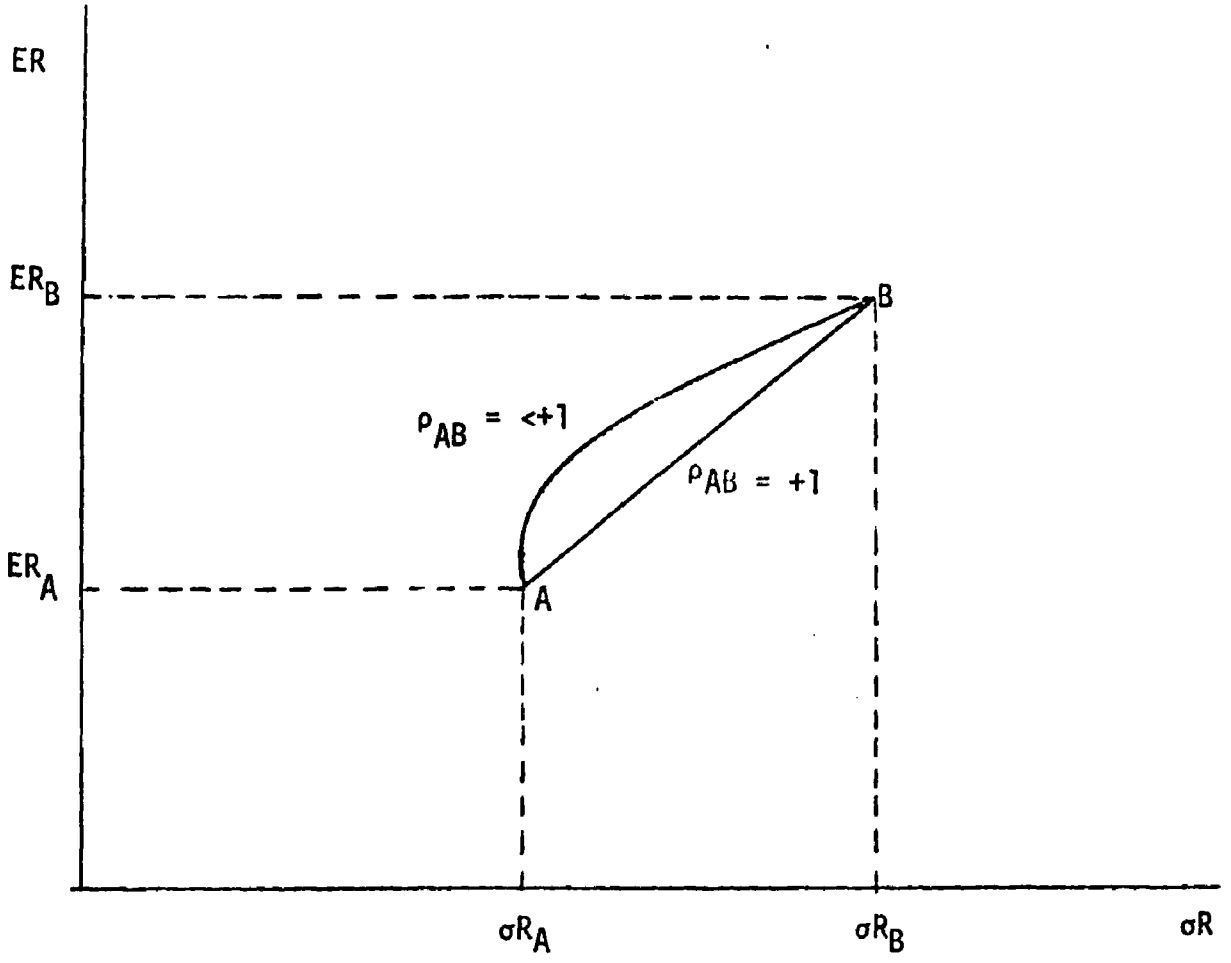

FIGURE 4.4

EFFECTS OF DIVERSIFICATION ON THE EFFICIENT FRONTIER

Combinations of two securities which are perfectly positively correlated will lie along the straight line AB since both ER_p and σR_p will be linearly related to the proportions invested in the two securities. Combinations where $\rho_{AB} < 1$ will lie along a curve to the left of line AB. This curvature is, in essence, the rationale for diversification.[31]

---

[31]Sharpe, op. cit., p. 431.

If the indifference curves drawn in Figure 4.2 were superimposed on the Markowitz opportunity set in Figure 4.3, the result illustrates that an investor who has the particular family of indifference curves I_1, I_2, I_3, and is limited only to investments in the risky-asset opportunity set ABCDEF, will maximize his expected utility by investing in the combination of securities available at the tangency of I_2 at point B yielding ER_B and σR_B. This is depicted below (ignore line $R_F C$ for the moment):

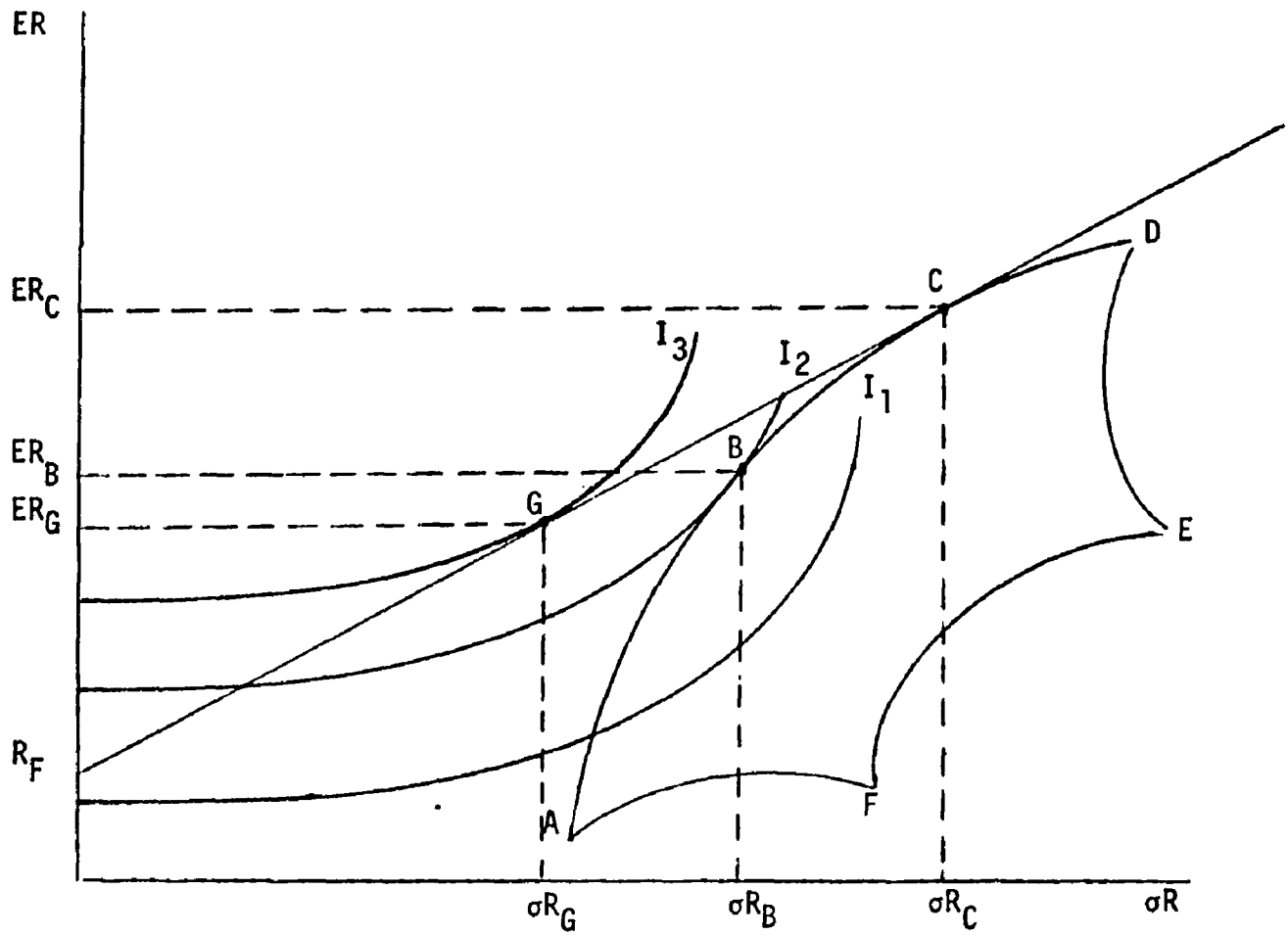

FIGURE 4.5

A MARKOWITZ EFFICIENT INVESTOR MAXIMIZING UTILITY

Adding the possibility that risk-free assets exist, such as U. S. Government Treasury Bills or cash, which yield R_F, then a new opportunity

set, designated line R_FC (Figure 4.5) becomes available to the investor. All investment combinations lying along the original curve from A to C are dominated by some combination of investment in C and lending at the risk-free rate (R_F).[32] The investor will allocate his resources between the risk-free assets (R_F) and the risky assets (C) in the proportion which places him on the highest indifference curve.[33] This is I_3 (Figure 4.5) at point G which yields ER_G and σR_G in the mean-standard deviation plane. This opportunity locus R_FC can be extended beyond C if the investor can also borrow at the riskless rate (R_F). In the literature this opportunity locus has been designated as the capital market line (CML).[34]

EQUILIBRIUM IN CAPITAL MARKETS

Theories of capital market equilibrium under conditions of risk rest on two important assumptions.

1. There is a common pure rate of interest available to all investors on equal terms to either borrow or lend funds.
2. There exists homogeneity of investor expectations: investors are assumed to agree on the prospects of various investments--the expected values, standard deviations and correlation coefficients.[35]

---

[32]Sharpe, op. cit., pp. 432-3.

[33]Tobin, op. cit., pp. 72-3.

[34]Jensen, op. cit., p. 197.

[35]Sharpe, op. cit., pp. 433-4.

Since the CML dominates the opportunity set, all Markowitz-efficient investors will seek to be on the CML. They will purchase only combinations of securities comprising portfolio C and risk-free assets. The particular combination of portfolio C and R_F assets depends upon the investor's attitude toward risk and return as shown by his indifference map. Less risky efficient combinations will include both R_F assets and portfolio C. More risky efficient combinations will include only portfolio C and borrowing at the risk-free rate. Portfolio C is the market portfolio. In equilibrium every security in the market is owned by someone. Since everyone desires portfolio C, the market portfolio must consist of all risky assets in the market, each weighted by the ratio of its total market value to the market value of all assets, and in addition, the riskless rate R_F must be such that net borrowing in the market is zero; that is, at the rate R_F the total quantity of funds that people want to borrow is equal to the quantity that others want to lend.[36]

In equilibrium there is a simple linear relationship between the expected return and the expected standard deviation of returns for the market portfolio. However, individual risky securities will lie within the opportunity set ABCDEF (Figures 4.5, 4.6) because they are undiversified and, therefore, inefficient in the Markowitz sense. Sharpe noted that the equilibrium condition implied both a measure of the risk of security i, and the equilibrium relationship between the risk and the expected return on that security.[37]

---

[36]Eugene F. Fama, "Risk, Return and Equilibrium: Some Clarifying Comments," The Journal of Finance, Vol. XXIII, No. 1 (March, 1968), p. 33.

[37]Ibid., p. 35.

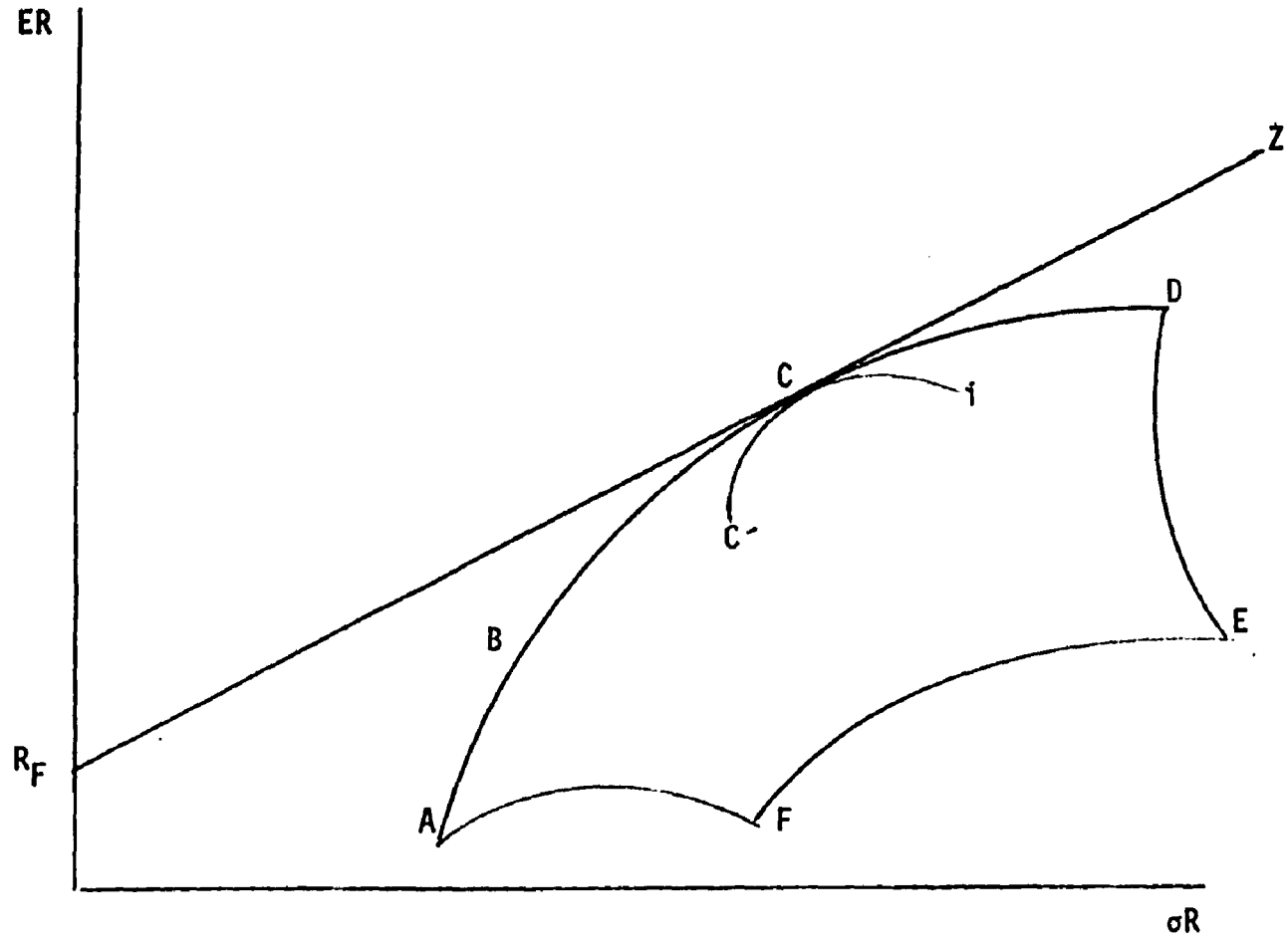

FIGURE 4.6

TYPICAL RELATIONSHIP BETWEEN INDIVIDUAL SECURITIES AND AN EFFICIENT COMBINATION - THE MARKET PORTFOLIO

Figure 4.6 illustrates the typical relationship between individual security i and the market portfolio C of which it is a part. The curve iCC' shows all expected return-expected standard deviation possibilities which are obtainable by combining security i with market portfolio C in varying proportions. In equilibrium, curve iCC' and all such curves will be tangent to R_FCZ because, (1) they must touch it at the point representing the efficient combination, and (2) they are continuous at that point.[38]

---

[38]Sharpe, op. cit., p. 437.

The tangency must exist, otherwise the curve would cut R_FCZ, an impossibility, because there are no feasible combinations of securities to the left of the efficient boundary.[39]

The tangency of curves such as iCC' allowed Sharpe to relate the expected rate of return to various elements of risk for all securities included in the market portfolio. He did this by regressing ex post returns of security i on ex post returns of the market portfolio. This is the Sharpe diagonal model and its economic meaning is discussed briefly.

Sharpe developed the diagonal model because of the large number of parameters to estimate in the Markowitz model. The diagonal model has the virtue of being one of the simplest which can be constructed without assuming away the existence of interrelationships among securities.[40] The model's major assumption is that the returns of various securities are related only through common relationships with some basic index such as the level of the stock market as a whole, the GNP, some price index or any other factor thought to be the most important single influence on the return of securities.[41] The ability of the diagonal model to generate efficient portfolios relative to the Markowitz full covariance model has been empirically validated by Sharpe[42] and others.[43] The Sharpe diagonal model

---

[39] Ibid., pp. 437-8.

[40] W. F. Sharpe, "A Simplified Model for Portfolio Analysis," Management Science, Vol. IX (January, 1963), pp. 277-293.

[41] Ibid., p. 281.

[42] Ibid., pp. 291-2.

[43] K. J. Cohen and J. A. Pogue, "An Empirical Evaluation of Alternative Selection Models," Journal of Business, Vol. XL, No. 2 (April, 1967), pp. 166-193. B. A. Wallingford, "A Survey and Comparison of Portfolio Selection Models," Journal of Financial and Quantitative Analysis (June, 1967), pp. 85-106.

specifies the following relationships:

$$\tilde{R}_i = a_i + B_i\tilde{R}_M + \tilde{e}_i \qquad i = 1, 2, \ldots, N \quad (4.3)$$

where:

$$E(\tilde{e}) = 0$$

$$Cov(\tilde{R}_M, \tilde{e}_i) = 0$$

$$Cov(\tilde{e}_i, \tilde{e}_j) = 0 \qquad i \neq j$$

$\tilde{R}_i$ = expected return on security i.

$\tilde{R}_M$ = return on market portfolio M (some basic index of market returns).

$\tilde{e}_i$ = an individualistic factor reflecting that portion of security i's return which is not a linear function of R_M.

a_i, B_i = intercept and slope associated with the linear relationship (parameters specific to asset $_i$).

Basically what the model posits is that a security's return can be divided into two parts: first a systematic component $[B_i(R_M)]$ which reflects common movement of a single security's return with the average return of all other securities in the market; and second, an individualistic component (e_i) which reflects the residual portion of a security's return that moves independently of the market-wide return and the other securities.[44] For an individual security the variance of this model is defined as:

---

[44] W. Beaver, P. Kettler, and M. Scholes, "The Association Between Market Determined and Accounting Determined Risk Measures," The Accounting Review, XLV, No. 4 (October, 1970), p. 657.

$$\sigma^2(R_i) = \sigma^2(e_i) + B_i^2\, \sigma^2(R_M) \tag{4.4}$$

where:

$\sigma^2(R_i)$ = variance of return on security i.

$\sigma^2(e_i)$ = variance of the individualistic factors.

$\sigma^2(R_M)$ = variance of the market return.

As the size of the portfolio increases from one security the variance of this model becomes:

$$\sigma^2(R_p) = (\tfrac{1}{N})\ E\ [\sigma^2(e_i)] + [E(B)]^2\ \sigma^2(R_M) \tag{4.5}$$

where:

$\sigma^2(R_p)$ = variance of return on the portfolio.

N = number of securities in the portfolio.

$E[\sigma^2(e_i)]$ = expected value of the variances of the individualistic factors.

E(B) = expected value of the B_i's.

$\sigma^2(R_M)$ = variance of the market return.

As N increases, the first term on the right hand side → o, since risk averse investors will select an efficiently diversified portfolio, and the diagonal model becomes:

$$\sigma^2(R_p) = [E(B)]^2\ \sigma^2(R_M) \tag{4.6}$$

$\sigma^2(R_p)$ will differ among portfolios according to the magnitude of E[B]. Therefore, the risk that the nth security contributes to the portfolio is measured by its B_i.[45] The B_i is the unavoidable risk of the security

---

[45] Ibid.

and measures the security's sensitivity to market-wide events. It is unavoidable because it is that portion of the variance of the security's return that cannot be diversified away by increasing the size of the portfolio.[46] The larger the value of B_i the more risky the security, and correspondingly the greater the required rate of return.

Holding to the same assumptions underlying portfolio analysis, Sharpe and others[47] considered the implications for the stock market if all investors became "Markowitz-efficient investors." The result is a capital asset pricing model which determines the equilibrium prices for all securities in the market. The essential feature of the model is a linear function on the risk-return plane, which represents all of the possible portfolios an investor can devise, given the ability to borrow or lend at the risk-free rate. This function, designated as the capital market line (CML), developed earlier in the chapter, can be viewed as the locus of the maximum rates of returns for each risk class.[48] Since this function is linear, knowledge of the risk-free rate of return and the expected return on the market portfolio will completely specify the CML. Given the CML, capital assets will be priced such that:

---

[46] Ibid., p. 658.

[47] W. F. Sharpe, "Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk," pp. 425-442. J. Lintner, "The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets," Review of Economics and Statistics, XLVII (February, 1965), pp. 13-37. J. Lintner, "Security Prices, Risk and Maximal Gains from Diversification," Journal of Finance, XX (December, 1965), pp. 587-616. J. Mossin, "Equilibrium in a Capital Asset Market," Econometrica, XXXIV (October, 1966), pp. 768-783.

[48] Francis and Archer, op. cit., p. 23.

$$E(\tilde{R}_i) = R_F + [E(\tilde{R}_M) - R_F] B_i \qquad (4.7)$$

$$= R_F + B_i[E(\tilde{R}_M)] - B_i R_F$$

$$= R_F(1 - B_i) + B_i[E(\tilde{R}_M)]$$

where:

$E(\tilde{R}_i)$ = expected return on security i.

R_F = rate of return on a riskless asset.

B_i = systematic risk.

$E(\tilde{R}_M)$ = expected return on the market portfolio.

The model states that the systematic risk coefficient B_i determined from Sharpe's diagonal is the only variable which determines differential returns among securities, since the individualistic factor is driven to zero through diversification; and further, that expected return of a security i is a linear function of the security's B_i.[49]

In order to give a more complete description of how Sharpe's diagonal index determines relevant risk and how this risk surrogate affects expected return via the capital asset model, a graphic analysis is presented in Figures 4.7 and 4.8.

---

[49]Beaver, Kettler, and Scholes, op. cit., p. 658.

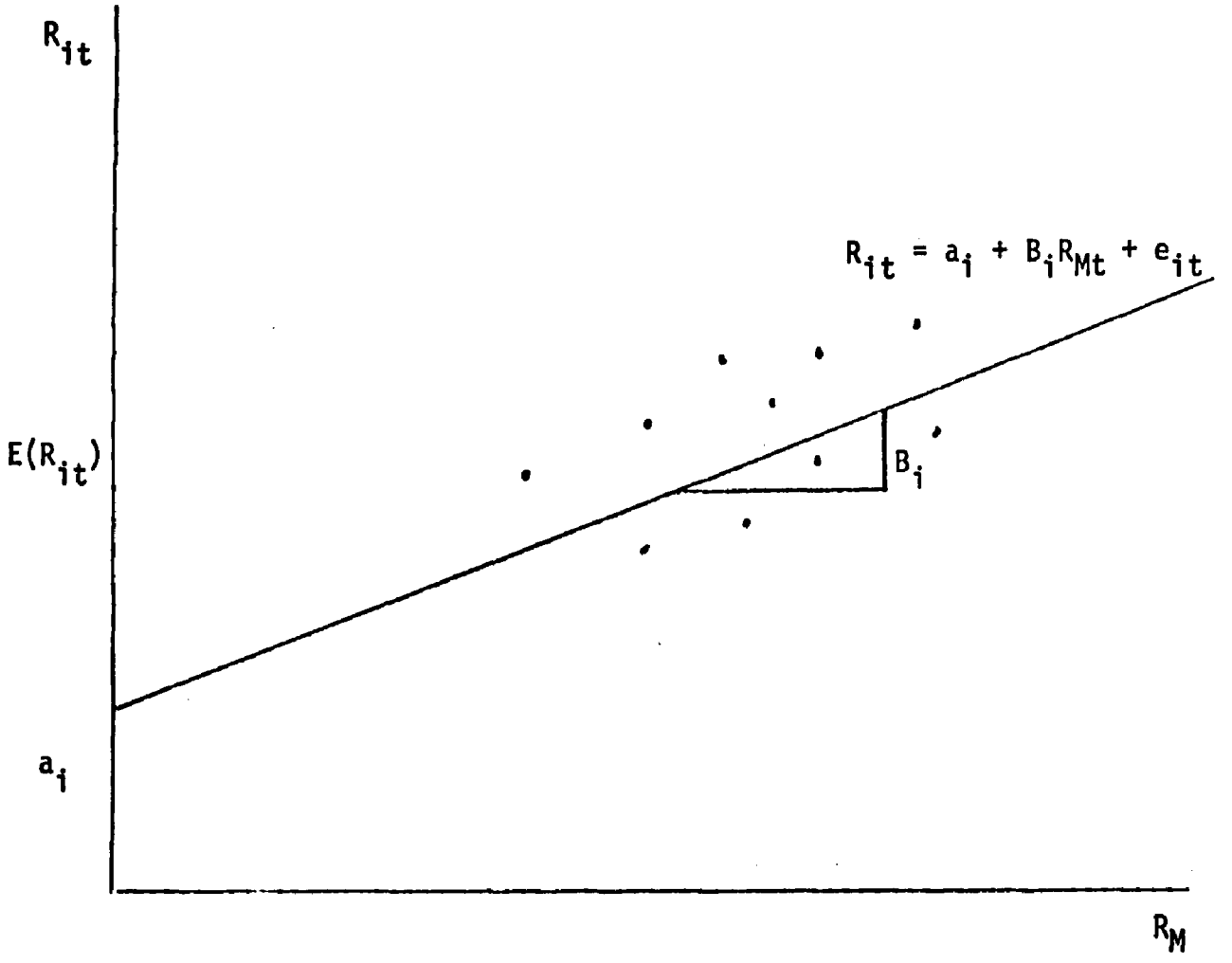

FIGURE 4.7

SHARPE'S DIAGONAL INDEX

The model is ex ante since risk itself is an ex ante concept, but ex post variables are used to determine B_i. Jensen demonstrated that it was permissible to use ex post numbers in the risk-return expectational model developed here.[50] Given a number of ex post empirical observations of

[50]Jensen, op. cit., pp. 167-185, 192-202, 241-247.

R_i and R_M:

where R_i = returns of security i for each of t periods

and R_M = returns of the market for each of t periods,[51]

estimates of a_i and B_i are obtained from a time series, least squares regression leading to the equation shown in the figure. The scatter of the R_i observations around their mean is evidence of the total risk of the security. However, part of the scatter is due to the underlying relationship with the return on the market, shown by B_i, the slope of the regression line. This component of the security's risk is the systematic risk.[52] The residual, or ex post standard error is the individualistic risk that can be diversified to zero. The formulation of this relationship between R_i and R_M can be employed ex ante as a predictive model in the form $r_i = E(R_i|R_M) = a_i + B_i R_M$, since the conditional expectation is fairly stationary over time.[53]

Once the Beta of a particular security i has been determined, that is, the extent to which the individual security moves with the market as a whole, the capital asset pricing model can be employed to determine the expected rate of return for that security.

---

[51] L. Fisher, "Some New Stock Market Indexes," Journal of Business, Vol. XXXIX (January, 1966), pp. 191-225.

[52] W. F. Sharpe, "Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk," Journal of Finance, Vol. XIX (September, 1964). Reprinted in Archer and D'Ambrosio, The Theory of Business Finance: A Book of Readings (New York: The Macmillan Co., 1967), p. 667.

[53] M. E. Blume, "The Assessment of Portfolio Performance--An Application to Portfolio Theory" (unpublished Ph.D. dissertation, University of Chicago, 1968).

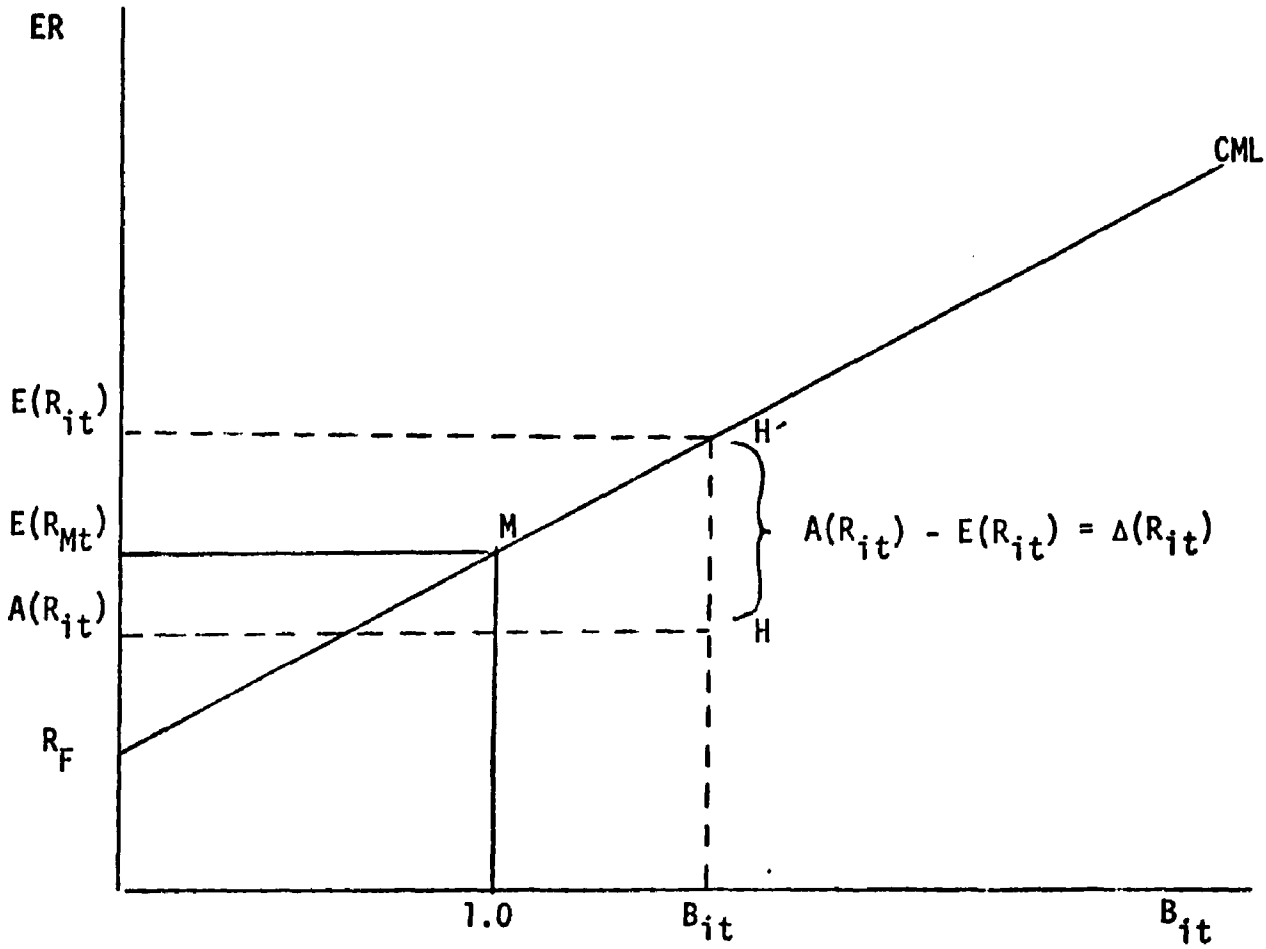

FIGURE 4.8

CAPITAL ASSET PRICING MODEL

Given the return on the market (R_M), and since beta for the market must be 1.0, point M is determined. A line is then drawn from the risk-free rate (R_F) through point M giving the CML (these are the solid lines). Next, the beta for a particular security i, as measured by the Sharpe diagonal model, is shown on the B_{it} axis. Actual return [$A(R_{it})$] is plotted on the E(R) axis.

Figure 4.8 illustrates that given the systematic risk (B) for security i, the yield should be expected return [$E(R_{it})$], reading H' to the vertical axis. However, the actual return [$A(R_{it})$] was only H, indicating that the security was overpriced at the beginning of the period. Actually,

once the market is cognizant of the fact that the security does not offer sufficient returns to induce rational investors to accept the amount of systematic risk they must bear, the price of that security will drop raising rate of return until the equilibrium rate of return is reached. The equilibrium-seeking movements of the market cause the price decrease and the negative risk-adjusted rate of return [$E(R_{it}) > A(R_{it})$].

SUMMARY

The expectational model developed in this chapter divides rate of return into two components from which it derives: returns stemming from the systematic movements of individual stock prices with the general movements of the market and returns stemming from events unique to the individual firm. By discounting returns from systematic movements, the residual rate of return based on events unique to the individual firm can be determined. This portion of return is theoretically related to accounting data which purports to measure the company's economic events.

The variable to be predicted in this study is ΔR_{it}, the risk-adjusted rate of return, which is the difference between $E(R_{it})$ and $A(R_{it})$. Because of the evidence suggesting that the major security exchanges are good examples of efficient markets, it is unlikely that a lagged relationship between the alternative accounting flow variable and ΔR_{it} will be uncovered. However, the a priori expectations indicate that a contemporaneous association will be disclosed because earnings are the single most important factor in the determination of common stock prices, and because accounting data measure the proper revenue and expense, i.e., those events which relate to the risk-adjusted rate of return.

CHAPTER V

METHODOLOGY

THE ACCOUNTING VARIABLES

This study purports to evaluate alternative accounting flow variables for investor use. The accounting flow variables being evaluated are discussed in Chapter III and briefly restated here.

Net Income Available to Common Stockholders (EA)

Net Recurring Income (ER)

Current Recurring Flow (CR)

Net Recurring Income less Changes in Inventories (ER ΔI)

In order to test these variables, the net change in the variable from the beginning of the year to the end of the year was computed. The exact specification of the variables is shown below.

$$\Delta EA_{(t)} = \frac{EA_{(t+1)} - EA_{(t)}}{|EA_{(t)}|} \tag{5.1}$$

$$\Delta ER_{(t)} = \frac{ER_{(t+1)} - ER_{(t)}}{|ER_{(t)}|} \tag{5.2}$$

$$\Delta CR_{(t)} = \frac{CR_{(t+1)} - CR_{(t)}}{|CR_{(t)}|} \tag{5.3}$$

$$\Delta(ER-\Delta I)_{(t)} = \frac{(ER-\Delta I)_{(t+1)} - (ER-\Delta I)_{(t)}}{|(ER-\Delta I)_{(t)}|} \tag{5.4}$$

All calculations were on a per share basis although they need not have been. Absolute values were used in the denominators because in situations where the flow variables were negative for the previous period, the sign of the change would be incorrect if the absolute value were not used.

ACTUAL RATE OF RETURN

The dependent variable, the variable of interest to investors, has been defined as the risk-adjusted rate of return for the ith company in period t, and was computed in accordance with the models presented in Chapter IV. Since the risk-adjusted rate of return (ΔR_{it}) is the difference between the actual rate of return (AR_{it}) and the expected rate of return (ER_{it}), that is, $\Delta R_{it} = AR_{it} - ER_{it}$, the first term on the right hand side of the equation (AR_{it}) was computed first and then the second term (ER_{it}).

In order to determine (AR_{it}), price relatives (PR) were first computed for each of the two hundred and forty-one companies in the sample. The ten-year span from 1961-1970 required the calculation of ten price relatives for each company. This period encompassed all of the alternative holding periods and altogether two thousand four hundred and ten price relatives were calculated (241 x 10). The principle reasons for using the price relative are:

> (1) It measures the total gross return per dollar of original investment and is thus an all-inclusive gross percentage return formulation that is always positive (or, at worst, zero). Elimination of negative returns is a benefit; it allows us to calculate geometric mean returns....

(2) It allows rational comparison of the expected return from an asset both with the asset's returns in the past and with the expected return from all other assets for the coming period.[1]

The price relative formulation used was:

$$PR_t = \ln \left[\frac{SPC_{(t+1)} + D/S_{(t)}}{SPC_{(t)}} \right] \qquad (5.5)$$

where:

ln = natural logarithm

SPC = stock closing price

D/S = dividends per share

The natural log of the price relative was used primarily because it facilitates the calculation of the geometric mean rate of return, and also because it assumes continuous compounding.[2] Armed with the price relatives, the actual rate of return for thirty alternate holding periods was computed using the geometric mean. The formulation used was:

$$AR_{it} = \left(\exp \left[1/n \sum_{t=1}^{n} \ln (PR_{it}) \right] \right) - 1 \qquad (5.6)$$

where:

exp = the antilogarithm of the expression enclosed in brackets

n = number of periods

PR_{it} = price relative for security i in period t

---

[1]Henry A. Latane and Donald L. Tuttle, Security Analysis and Portfolio Management (New York: The Ronald Press Company, 1970), p. 62.

[2]Harry Markowitz, Portfolio Selection, Efficient Diversification of Investments (New York: John Wiley and Sons, Inc., 1959), p. 120.

The geometric mean is used to avoid the upward bias which results when the arithmetic mean is employed as a measure of central tendency for a compound time series.[3] Markowitz provides the following illustration:

Suppose that the return on a portfolio during eight consecutive years was as shown below.

year	1	2	3	4	5	6	7	8	average
return	.15	-.05	.20	00	-.05	+.05	00	.10	.05

One dollar invested in the portfolio at the beginning of year 1 grew to $1.15 by the end of the year (1.00 x 1.15). If this were reinvested at the end of the year, by the end of the second year it would have decreased to $1.09 (1.00 x 1.15 x .95). By the end of the eighth year it would have grown to $1.44.

$1.44 = (1.00 x 1.15 x .95 x 1.20 x 1.00 x .95 x 1.05 x 1.00 x 1.10)

Average Return, $.05, compounded annually for eight years equals $1.48 which is slightly greater than the value of the portfolio at the end of the eighth year.

$1.48 = $(1.05)^8$

To find the appropriate "average" rate of return for the eight-year period, the eighth root of $1.44 is taken and then one is deducted.[4] However, since it is cumbersome to evaluate the nth root of any number,

---

[3]Shannon P. Pratt, "Relationship Between Variability of Past Returns and Levels of Future Returns for Common Stocks, 1926-1960," Frontiers of Investment Analysis, ed. E. Bruce Fredrikson (2d ed.; Scranton: International Textbook Company, 1971), pp. 340-41.

[4]Markowitz, op. cit., p. 116.

equation (5.6) was used for actual computations[5] and seven thousand two hundred and thirty actual rates of return were calculated (30 holding periods x 241 companies).

EXPECTED RATE OF RETURN

In Chapter IV it was established that prices adjust until there is a linear relationship between the magnitude of the responsiveness of an asset's rate of return to the level of economic activity and expected return.[6] A more succinct statement is given by restating equation (4.7) of Chapter IV:

$$E(\tilde{R}_i) = R_F + [E(\tilde{R}_M) - R_F] B_i \qquad (5.7)$$

where:

$E(\tilde{R}_i)$ = expected return on security i

R_F = rate of return on a riskless asset

B_i = systematic risk

$E(\tilde{R}_m)$ = expected return on the market portfolio, which was used to calculate the expected return from each security for each alternative holding period.

The risk free rate used in the calculation of expected return was the average market yield of U. S. Government Securities, three month

---

[5]Jack C. Francis and Stephen H. Archer, Portfolio Analysis (Englewood Cliffs: Prentice-Hall, Inc., 1971), p. 12.

[6]James F. Sharpe, "Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk," The Journal of Finance, Vol. XIX, No. 3 (September, 1964), p. 442.

bills. This information was obtained from the Federal Reserve Bulletin and is disclosed in Appendix B.

The return on the market portfolio used in the calculation of expected return for each year was the Standard and Poor's Composite Stock Price Index as of the end of the 4th quarter. This information was obtained from "Standard and Poor's Trade and Securities, Statistics, Security Price Index Record" and is disclosed in Appendix C. The market relative (MR) was computed for each of the ten years 1961-1970 using the equation:

$$MR_t = \ln \left[\frac{CSPI_{(t+1)} + CD/S_{(t)}}{CSPI_{(t)}} \right] \qquad (5.8)$$

where:

ln = natural logarithm

CSPI = composite stock price index

CD/S = composite dividends per share

These market relatives were then used to obtain the geometric mean rate of return from the market portfolio for the thirty alternate holding periods under examination. The formulation of the equation used was:

$$E(R_{Mt}) = \left(\exp \left[1/n \sum_{t=1}^{n} \ln(MR_t) \right] \right) - 1 \qquad (5.9)$$

where:

exp = the antilog of the expression enclosed in brackets

n = number of periods

MR_t = the market relative in period t

This provided the market returns for each period, and when used in conjunction with the risk free rate for each period, the capital market line was established for each of the thirty alternate holding periods.

The beta coefficients for individual securities were supplied by the Computer Research and Applications Department of Merrill, Lynch, Pierce, Fenner and Smith, Inc. The betas are based on straight linear regressions with monthly differencing intervals covering a five-year period ending December 31, 1971. The market index used is the Standard and Poor's 500 Index. The betas for all two hundred and forty-one stocks are disclosed in Appendix A.

Altogether seven thousand two hundred and thirty expected rates of return were computed (241 companies x 30 holding periods) and were compared with the seven thousand two hundred and thirty actual rates of return, respectively. The difference, the risk-adjusted rate of return, is the variable to be predicted.

THE MEASURE OF ASSOCIATION

Cross sectional regression and correlation analysis was used to measure the association between variables. Association was measured by the coefficient of determination from regression equations using the natural log transformation of the raw data. Since many of the variables were negative, a constant was added to all the values of the variables. The coefficient of determination was also computed using the raw data, but lower r^2's resulted than when log transformations were used. This would seem to indicate that the distributions of the raw data did not meet the criteria of the bivariate linear correlation population model.[7]

---

[7] George J. Staubus, "The Association of Financial Accounting Variables with Common Stock Prices," The Accounting Review, XL (January, 1965), 125-6. Staubus found that points representing the earnings and discounted stock values tend to fall between two lines of different slopes intersecting at the origin of the scattergraph, indicating a gourd

The log transformations of the raw data meet the linear and homoscedasticity requirements of the bivariate linear correlation model. The use of logs also reduces the cross-section coefficient of variations because it minimizes the sum of the squares of the percentage deviations rather than the sum of the squares of the absolute deviations from the regression line.[8]

All computer programs to prepare the data for regression analysis are written in BASIC. The regression program itself, "Old Tuckreg", stored in the public library of the Dartmouth College time-sharing computer was used to perform the regression analysis.

F-tests were performed to determine the statistical significance of the regressions. In simple linear regression the F-test is the same as the T-test.[9] An example of a portion of the output from "Old Tuckreg" that this study utilized is shown in Appendix D.

---

shaped heteroscedastic condition. However, when he used natural logs he found that the two border lines of the scatter became parallel. Since this study is investigating the relationship between the same kinds of data that Staubus investigated, the same approach was used.

Heterescedasticity implies that the degree of correlation is not uniform throughout the entire series; hence its presence reduced the feasibility of a single overall measure of correlation. A scatter band whose width is uniform is referred to as homoscedastic. A homoscedastic condition must be approximated if the bivariate linear correlation model is to be used to measure association. See John H. Mueller and Karl F. Schuessler, Statistical Reasoning in Sociology (Boston: Houghton Mifflin Co., 1961), p. 287.

[8] Staubus, op. cit., p. 126.

[9] N. R. Draper and H. Smith, Applied Regression Analysis (New York: John Wiley and Sons, Inc., 1968), pp. 25-6.

CALCULATIONS

The first set of tests were designed to measure the future predictive ability of the alternative accounting flow variables. All ten base years, 1960 through 1969 were selected for observations on the independent variables. At the end of each base year an investor purchases one share of common stock (the decision data) and holds it for either one, three, five, seven, or nine years, and then sells it at the market price. During this period any dividends paid out are assumed to be reinvested. As stated earlier, actual rate of return, adjusted for capital changes, if any, was computed from the purchase price, sales price and dividends. For all holding periods greater than one year the geometric mean rate of return was used. This return was then compared with expected return, given the market, in order to arrive at the dependent variable (ΔR_{it}), the risk-adjusted rate of return.

The coefficients of correlation (r) between the natural logarithms of each of these risk-adjusted rates of return ($_{\Delta}R_{it}$) and the natural logarithms of the accounting variables ΔEA_{it}, $\Delta ER_{(it)}$, $\Delta CR_{(it)}$, and $\Delta(ER\text{-}\Delta I)_{(it)}$, defined earlier, for the base year were then computed. For example, consider base year 1960. The decision date is 1/1/61. ΔEA_i, ΔER_i, ΔCR_i, and $\Delta(ER\text{-}\Delta I)_i$ as of 12/31/60 for each company in the sample is correlated with ΔR_i for five alternate holding periods beginning with 1/1/61; ΔR_{61}, $\Delta R_{61\text{-}63}$, $\Delta R_{61\text{-}65}$, $\Delta R_{61\text{-}67}$, $\Delta R_{61\text{-}69}$. Thus, 20 r^2's are computed. The tabulation for each of the other base years is similar to the above except for the number of holding periods. The data is summarized by decision dates and length of holding period. Altogether one hundred

and twenty separate regressions were run, four accounting variables for each of thirty alternate holding periods.[10]

In the second set of tests, nine different base years, 1961 through 1969, were selected for observations on the independent variables. The purpose of the tests was to determine the degree of contemporaneous association between the accounting flow variables and the risk-adjusted rate of return. The dependent variable for year t was regressed on the independent variable for the same year t, for the years 1961 through 1969. The risk-adjusted rate of return in every regression was based on a holding period of one year duration. For example, ΔR_{61} was regressed separately on each of the four accounting variables for 1961; ΔR_{62} was regressed separately on each of the four accounting variables for 1962, and so on up through 1969. Altogether there were thirty-six separate regressions (9 years x 4 accounting variables.)

The criterion for usefulness is higher correlation between the operational measure of rate of return (ΔR_j) and a flow measure, as the flow measure is varied so that it is alternatively independent of inventory accounting, depreciation accounting and the inclusion of nonrecurring items. The first set of tests examine the possibility of the existence of a lagged relationship. As stated earlier, such a relationship would be ideal evidence of the future predictive ability of annual accounting flow data and would also raise serious doubts as to the efficiency of the security markets. The second set of tests concern themselves with the

---

[10] Actually another three hundred and sixty regressions were run; one hundred and twenty using the raw data, another one hundred and twenty using raw data with a modified beta, and another one hundred and twenty using logs with a modified beta. The results are not reported herein because the r^2's were so poor as to render the correlation meaningless.

degree of concurrent association between the variables. These tests provide evidence of the ability of accounting data to substantiate equilibrium market prices.

SAMPLE DESIGN

The study is based upon an analysis of 241 firms whose financial statement data are available on the Compustat Industrial Tape for the years 1958 through 1970, and whose fiscal year ends December 31.[11] The reasons for selecting these years are manifold. First, they contain both bull and bear markets, the bull market extending from 1961 through the beginning of 1969. Second, they contain a period of excess inventory accumulation, 1965 and 1966. Third, the whole period is marked by increased capital expenditures, particularly 1965 and 1966.[12] These economic factors are an important consideration in the analysis because they clearly will affect the reliability of certain flows as predictors.

The advantage of using the Standard and Poor's Compustat Tape is the minimization of the data collection task. The tape provides a list of seventy-two financial facts for a very large number of companies from 1950 through at least 1970 and is constantly being updated. Data for the tape is taken from corporate financial reports, material from the Securities and Exchange Commission, the Bank & Quotation Records, the S&P Stock

---

[11] The Compustat Tape is available at the Amos Tuck School at Dartmouth College. A time-sharing arrangement between Boston College School of Management and the Amos Tuck School provides Boston College personnel access to the Dartmouth College computer facilities.

[12] U. S. Department of Commerce, Bureau of the Census, Business Conditions Digest, Series ES1 No. 71-5 (Washington, D.C.: May, 1971).

Guide and other sources. Often there are differences between the data sources and the data on the tape. This is due to the fact that Compustat seeks to achieve as much comparability among companies as possible and makes frequent adjustments to the data.

The list of facts that were utilized in this study is shown in Appendix E. Stock prices are reported on a calendar-year basis, and are adjusted for all stock splits and stock dividends that occurred in the calendar year. Dividends per share are adjusted in the same way. Stock splits are included in the adjustment to the subsequent year's price quotations, and stock dividends are also included in the adjustment when the stock dividend is greater than ten per cent. The number of common shares outstanding represents the net number of common shares outstanding at year-end, excluding treasury shares and scrip. The other data items are self explanatory.

THE APPROPRIATENESS OF THE MODELS UTILIZED

An explanation of the results hinges largely on the assumptions about market efficiency. The tests involving a one-year time lag explicitly assume inefficiencies in the capital markets and the possibility of earning abnormal returns with publicly available information. However, the evidence seems to indicate that the speed with which the market reacts to public information utterly negates the possibility of earning abnormal returns.[13] Since market efficiency has already been discussed in Chapter I,

---

[13] Another possibility for consideration is that certain lags exist in the assimilation of complex financial variables generated from basic reported information. For example, if computers can work with past, publicly available data to derive variables that have predictive ability in forecasting the coming quarter's earnings per share accurately, then

further consideration of the question would be tautological. Rather, attention is directed first toward the appropriateness of employing the diagonal model in conjunction with the capital asset pricing model to determine the risk-adjusted rate of return; secondly, at correlation as a measure of association. Each of these will be discussed in turn.

The use of the diagonal model to determine the responsiveness of an individual security's return to the average return of all other securities in the market is more appealing than other models which ignore the market component of return. Conceptually at least, the beta coefficient and the capital asset pricing model taken together appear to be ideally suited to highlight the portion of return which stems from events which are unique to the individual companies by the elimination of general market movements.

The diagonal model has been questioned first because industry effects have not been isolated; and secondly, because the market index of returns is correlated with the residual since the market index contains the return of the firm whose earnings represent the dependent variable. Neither question seriously challenges the model. Non-isolation of returns relating to the industry factor is not a major detriment to the model because King has shown that industry-wide events account for approximately only 10 per cent of the variability in a particular security's return.[14] The second question too can be considered trivial because the

---

profits can be made because persons without access to computers have been unable to draw predictive conclusions from publicly available information. This is tantamount to creating private information. See. H.A. Latane and D. L. Tuttle, op. cit., pp. 507-8.

[14] Benjamin F. King, "Market and Industry Factors in Stock Price Behavior," Supplement to the Journal of Business, Vol. XXXIX (January, 1966), pp. 139-190.

index of market returns is made up of a list of a very large number of stocks, the Standard and Poor's 500 Stock Index, thus minimizing the impact of the inclusion of a particular firm within the index. The beta coefficients used in this study were computed using only five years of monthly data. This time period may be of insufficient length because not all of the actual beta coefficients were significant at the $<.001$ level although the preponderance were and those that were not were reasonably close. It was also further assumed that the betas are stationary over time. This assumption is necessary since the betas were computed over the 1967-1971 period and utilized in the capital asset pricing model from 1961-1970. The assumption of stationarity can be supported. Blume, Jensen, Beaver, Kettler and Scholes have provided evidence that this is true, but the issue has not been resolved.[15] The assumption of equilibrium underlying the market models is not unrealistic in view of the efficiency with which the markets function. Admittedly, there are barriers to the adjustment process, barriers which are attributed to capital rationing, differential tax treatments, transaction costs, etc., but they are minor and thus any disequilibrium is minor.[16]

Empirical research done by Beaver, Kettler, and Scholes, which

---

[15] Marshall Blume, "The Assessment of Portfolio Performance--An Application to Portfolio Theory," (unpublished Ph.D. dissertation, University of Chicago, 1968). Michael C. Jensen, "Risk, The Pricing of Capital Assets, and the Evaluation of Investment Portfolios," Journal of Business, Vol. XLII, No. 2 (April, 1968), pp. 167-185, 192-202, 241-247. William H. Beaver, P. Kettler, and M. Scholes, "The Association between Market Determined and Accounting Determined Risk Measures," The Accounting Review, Vol. XLV, No. 4 (October, 1970), pp. 654-682.

[16] Marc Nerlove, "Factors Affecting Differences Among Rates of Return on Investments in Individual Common Stocks," The Review of Economics and Statistics, Vol. L, No. 3 (August, 1968), pp. 312-313.

utilizes the diagonal model, has produced results which are viewed as highly satisfactory, and which lead to the conclusion that these models are appropriate for this study.[17] Fama, Fisher, Jensen, and Roll have concluded that regressions of individual security returns on market returns over time, satisfactorily abstract from the effects which general market conditions have upon monthly rates of return, and furthermore, through the use of the natural logarithmic transforms of price relatives, they found that scatter diagrams on the diagonal model meet the bivariate linear regression requirements of linearity, homoscedasticity, and serial independence.[18]

The ordinary least squares regression model is generally considered a useful technique to discover general relationships between observed variables. A significant lack of fit may be because the simple linear model used here is not appropriate. Secondly, there are many other variables that influence the operational rate of return that are not included among the independent variables, such as dividend payout, growth of earnings, financial ratios, earnings retention, etc. The omission of these variables may introduce a statistical bias that is not trivial, but this is unlikely, based on the theorizing set forth earlier.

---

[17] Beaver, Kettler, and Scholes, op. cit., pp. 654-682.

[18] E. F. Fama, L. Fisher, M. Jensen, and R. Roll, "The Adjustment of Stock Prices to New Information," International Economic Review, Vol. X (February, 1969), pp. 1-21.

CHAPTER VI

RESULTS AND CONCLUSIONS

RECAPITULATION

The purpose of this paper is to investigate and evaluate the ability of selected accounting data to provide information which is useful in the investor's decision-making process. Specifically the theory (Chapter III) suggested that the principles of income determination relating to:

1. The Inclusion of Nonrecurring Items
2. Depreciation Accounting
3. Inventory-Cost of Sales Accounting

detract from the usefulness of the resulting net income flow variable. The results of theorizing indicate that the present income model could be improved upon by eliminating nonrecurring items, by substituting purchases for cost of goods sold and by excluding the effects of depreciation. This led to the formulation of the following hypotheses.

H_1: Net Income Available to Common Stockholders (EA) is more useful to investors in common stock than Net Recurring Income (ER) for predicting the risk-adjusted rate of return.

H_2: Net Income Available to Common Stockholders (EA) or Net Recurring Income (ER) is more useful to investors in common stock than Current Recurring Flow (CR) for predicting the risk-adjusted rate of return.

H_3: Net Income Available to Common Stockholders (EA) or Net Recurring Income (ER) is more useful to investors in common stock than Net Recurring Income less Changes in Inventories (ER-ΔI) for predicting the risk-adjusted rate of return.

However, the a priori expectations of discovering a lagged relationship between the alternative accounting flow variables and the risk-adjusted rate of return in an efficient market environment are doubtful. Nevertheless, the tests are performed because the existence of an efficient market has not been definitively settled. If a relationship is uncovered, contrary to expectations, it is interpreted as proof of the relative usefulness of the alternative flow variables to predict future market performance of common stocks and prima facie evidence confuting the efficient market hypothesis. If on the other hand, the evidence is consistent with a priori expectations, the accounting variables are not considered useful to predict future market performance, and the relationship between the alternative accounting variables and the risk-adjusted rate of return over concurrent time periods is examined to determine the extent of contemporaneous association, which is also a measure of the relative usefulness of the data to investors.

The a priori grounds for expecting to find a contemporaneous association are based upon three major assumptions:

1. Accounting measures the proper economic events, i.e., those events which will ultimately determine the future cash flows accruing to the investor.

2. One characteristic of the nature of these events is that they are systematically related. Their stability over time provides a basis for predicting the trend and variability of future cash flows.

3. An efficient market will instantly and unbiasedly impound this information into common stock prices and thus assure a contemporaneous association.

If an association is observed, as expected, it is interpreted to mean that accounting flow variables reflect the same underlying events that are reflected in security prices and the accounting data is deemed useful in its ability to substantiate equilibrium market prices, post facto. On the other hand, if no association is observed, the accounting data cannot unequivocally be deemed useless, although such findings leave room for this kind of speculation. Unsubstantiated statements averring that the accounting flow variables do not reflect the same underlying events that are reflected in security prices must be subjected to further investigation and validation.

RESULTS OF THE LAGGED RELATIONSHIP TESTS

The results of the lagged relationship tests are shown in Tables I, II and III. These tests were designed to measure the ability of a flow variable to predict market performance of an investment holding in a period subsequent to the accounting period. Tables I and II dramatically point out that there was no significant relationship between historical accounting information and the risk-adjusted rate of return. Table III further shows that from a total of one hundred and twenty regressions only two estimates of the regression equation (EA_{64}) were significant at the <.001 level; that is, there was a <.001 probability that these f-ratios could have been observed even if no linear relationship existed.

RESULTS

TABLE I

r^2 Values, 241 Stocks for Alternate Holding Periods

Holding Periods Commencing 1/1/61

	ΔR61	ΔR61-63	ΔR61-65	ΔR61-67	ΔR61-69	Mean
ΔEA60	.0068	.0000	.0017	.0014	.0025	.0025
ΔER60	.0086	.0000	.0014	.0013	.0020	.0027
ΔCR60	.0012	.0005	.0119	.0125	.0074	.0067
Δ(ER-ΔI)60	.0006	.0006	.0003	.0000	.0024	.0008

Holding Periods Commencing 1/1/62

	ΔR62	ΔR62-64	ΔR62-66	ΔR62-68	ΔR62-70	Mean
ΔEA61	.0010	.0067	.0011	.0176	.0463	.0145
ΔER61	.0005	.0000	.0024	.0079	.0364	.0094
ΔCR61	.0007	.0009	.0084	.0021	.0024	.0029
Δ(ER-ΔI)61	.0024	.0041	.0014	.0005	.0038	.0024

Holding Periods Commencing 1/1/63

	ΔR63	ΔR63-65	ΔR63-67	ΔR63-69	Mean
ΔEA62	.0004	.0056	.0022	.0001	.0021
ΔER62	.0001	.0025	.0007	.0002	.0009
ΔCR62	.0144	.0069	.0100	.0014	.0082
Δ(ER-ΔI)62	.0002	.0000	.0024	.0001	.0007

Holding Periods Commencing 1/1/64

	ΔR64	ΔR64-66	ΔR64-68	ΔR64-70	Mean
ΔEA63	.0086	.0006	.0030	.0104	.0057
ΔER63	.0012	.0009	.0043	.0124	.0047
ΔCR63	.0025	-.0002	-.0004	-.0002	.0004
Δ(ER-ΔI)63	.0059	.0146	.0245	.0179	.0157

TABLE I Continued

Holding Periods Commencing 1/1/65

	ΔR65	ΔR65-67	ΔR65-69	Mean
ΔEA64	.0572	.0678	.0127	.0459
ΔER64	.0454	.0387	.0056	.0299
ΔCR64	.0348	.0311	.0056	.0238
Δ(ER-ΔI)64	.0266	.0253	.0027	.0182

Holding Periods Commencing 1/1/66

	ΔR66	ΔR66-68	ΔR66-70	Mean
ΔEA65	.0117	.0094	.0329	.0180
ΔER65	.0106	-.0000	.0058	.0055
ΔCR65	.0003	.0054	.0216	.0091
Δ(ER-ΔI)65	.0001	.0060	.0059	.0040

Holding Periods Commencing 1/1/67

	ΔR67	ΔR67-69	Mean
ΔEA66	.0012	.0126	.0069
ΔER66	.0027	.0083	.0055
ΔCR66	.0130	.0009	.0070
Δ(ER-ΔI)66	.0003	.0007	.0005

Holding Periods Commencing 1/1/68

	ΔR68	ΔR68-70	Mean
ΔEA67	.0058	.0275	.0167
ΔER67	.0059	.0181	.0120
ΔCR67	.0008	.0000	.0004
Δ(ER-ΔI)67	.0006	.0083	.0045

Holding Period Commencing 1/1/69

	ΔR69
ΔEA68	.0008
ΔER68	.0250
ΔCR68	.0008
Δ(ER-ΔI)68	.0200

TABLE I Continued

Holding Period Commencing 1/1/70

	ΔR70
ΔEA69	.0051
ΔER69	.0078
ΔCR69	.0093
Δ(ER-ΔI)69	.0072

TABLE II

r^2 Values, 241 Stocks Summarized by Length of Holding Period (years)

	Years				
	1	3	5	7	9
ΔEA 60	.0068	.0000	.0017	.0014	.0025
61	.0010	.0067	.0011	.0176	.0463
62	.0004	.0056	.0022	.0001	
63	.0086	.0006	.0030	.0104	
64	.0572	.0678	.0127		
65	.0117	.0094	.0329		
66	.0012	.0126			
67	.0058	.0275			
68	.0008				
69	.0051				
Mean	.0099	.0168	.0089	.0074	.0244

	Years				
	1	3	5	7	9
ΔER 60	.0086	.0000	.0014	.0013	.0020
61	.0005	.0000	.0024	.0079	.0364
62	.0001	.0025	.0007	.0002	
63	.0012	.0009	.0043	.0124	
64	.0454	.0387	.0056		
65	.0106	-.0000	.0058		
66	.0027	.0083			
67	.0059	.0181			
68	.0250				
69	.0078				
Mean	.0108	.0086	.0034	.0055	.0192

TABLE II Continued

	Years				
	1	3	5	7	9
ΔCR 60	.0012	.0005	.0119	.0125	.0074
61	.0007	.0009	.0084	.0021	.0024
62	.0144	.0069	.0100	.0014	
63	.0025	-.0002	-.0004	-.0002	
64	.0348	.0311	.0056		
65	.0003	.0054	.0216		
66	.0130	.0009			
67	.0008	.0000			
68	.0008				
69	.0093				
Mean	.0078	.0087	.0095	.0040	.0049

		Years				
		1	3	5	7	9
Δ(ER-ΔI)	60	.0006	.0006	.0003	.0000	.0000
	61	.0024	.0041	.0014	.0005	.0038
	62	.0002	.0000	.0024	.0001	
	63	.0059	.0146	.0245	.0179	
	64	.0266	.0253	.0027		
	65	.0001	.0060	.0059		
	66	.0003	.0007			
	67	.0006	.0083			
	68	.0200				
	69	.0072				
Mean		.0064	.0075	.0062	.0046	.0019

TABLE III

Statistical Significance of the Regression Using F-Ratios

Holding Periods Commencing 1/1/61

	ΔR61		ΔR61-63		ΔR61-65		ΔR61-67		ΔR61-69	
	F-Ratio	P	F-Ratio	P	F-Ratio	P	F-Ratio	P	F-Ratio	P
ΔEA60	1.632	.200	.001	NS*	.412	NS	.328	NS	.604	NS
ΔER60	2.081	.147	.004	NS	.335	NS	.307	NS	.484	NS
ΔCR60	.284	NS	.125	NS	2.879	.087	3.034	.079	1.788	.179
Δ(ER-ΔI)60	.140	NS	.153	NS	.012	NS	.012	NS	.58	NS

Holding Periods Commencing 1/1/62

	ΔR62		ΔR62-64		ΔR62-66		ΔR62-68		ΔR62-70	
	F-Ratio	P	F-Ratio	P	F-Ratio	P	F-Ratio	P	F-Ratio	P
ΔEA61	.238	NS	1.61	.203	.27	NS	4.296	.037	11.592	.001
ΔER61	.119	NS	.01	NS	.57	NS	1.914	.164	9.029	.003
ΔCR61	.178	NS	.214	NS	2.03	.152	.506	NS	.567	NS
Δ(ER-ΔI)61	.57	NS	.975	NS	.334	NS	.118	NS	.9	NS

Holding Periods Commencing 1/1/63

	ΔR63		ΔR63-65		ΔR63-67		ΔR63-69	
	F-Ratio	P	F-Ratio	P	F-Ratio	P	F-Ratio	P
ΔEA62	.104	NS	1.349	.245	.528	NS	.014	NS
ΔER62	.03	NS	.6	NS	.169	NS	.047	NS
ΔCR62	3.49	.06	1.649	.197	2.394	.119	.336	NS
Δ(ER-ΔI)62	.048	NS	.002	NS	.579	NS	.022	NS

Holding Periods Commencing 1/1/64

	ΔR64		ΔR64-66		ΔR64-68		ΔR64-70	
	F-Ratio	P	F-Ratio	P	F-Ratio	P	F-Ratio	P
ΔEA63	2.068	.148	.135	NS	.73	NS	2.503	.111
ΔER63	.29	NS	.227	NS	1.041	.309	3.01	.08
ΔCR63	.602	NS	-.047	NS	-.085	NS	-.043	NS
Δ(ER-ΔI)63	1.415	.233	3.533	.058	5.996	.014	4.353	.036

* NS is no solution, i.e., the probability that the estimated regression equation is due to chance is greater than 30 per cent.

TABLE III Continued

Holding Periods Commencing 1/1/65

	ΔR65		ΔR65-67		ΔR65-69	
	F-Ratio	P	F-Ratio	P	F-Ratio	P
ΔEA64	14.5	<.001	17.372	<.001	3.083	.077
ΔER64	11.371	.001	9.622	.003	1.356	.244
ΔCR64	8.612	.004	7.678	.006	1.344	.246
Δ(ER-ΔI)64	6.531	.011	6.212	.013	.658	NS

Holding Periods Commencing 1/1/66

	ΔR66		ΔR66-68		ΔR66-70	
	F-Ratio	P	F-Ratio	P	F-Ratio	P
ΔEA65	2.829	.09	2.266	.13	8.141	.005
ΔER65	2.564	.107	-.007	NS	1.404	.235
ΔCR65	.065	NS	1.294	.255	5.273	.021
Δ(ER-ΔI)65	.021	NS	1.446	.228	1.411	.234

Holding Periods Commencing 1/1/67

	ΔR67		ΔR67-69	
	F-Ratio	P	F-Ratio	P
ΔEA66	.289	NS	3.059	.078
ΔER66	.637	NS	1.99	.156
ΔCR66	3.151	.073	.227	NS
Δ(ER-ΔI)66	.065	NS	.156	NS

Holding Periods Commencing 1/1/68

	ΔR68		ΔR68-70	
	F-Ratio	P	F-Ratio	P
ΔEA67	1.396	.237	6:751	.01
ΔER67	1.407	.237	4.397	.035
ΔCR67	.179	NS	.007	NS
Δ(ER-ΔI)67	.179	NS	1.99	.156

TABLE III Continued

Holding Period Commencing 1/1/69

	ΔR69	
	F-Ratio	P
ΔEA68	.182	NS
ΔER68	6.122	.013
ΔCR68	.198	NS
Δ(ER-ΔI)68	4.888	.026

Holding Period Commencing 1/1/70

	ΔR70	
	F-Ratio	P
ΔEA69	1.223	.269
ΔER69	1.887	.167
ΔCR69	2.252	.131
Δ(ER-ΔI)69	1.745	.185

TABLE IV

r^2 Values, 240 Stocks One Year

Holding Periods Commencing 1/1/61, no lag

	ΔR61	ΔR62	ΔR63	ΔR64	ΔR65	ΔR66	ΔR67	ΔR68	ΔR69
ΔEA	.1162	.0635	.1625	.1526	.3220	.0458	.1668	.0105	.0026
ΔER	.1123	.0616	.1451	.1482	.2534	.0373	.0565	.0140	.0008
ΔCR	.0134	.1182	.1563	.0690	.0826	.0149	.0226	.0070	.0140
Δ(ER-ΔI)	.0184	.0000	.0009	.0154	.0009	.0002	.0003	.0012	.0092

TABLE V

Statistical Significance of the Regression Using F-Ratios

	ΔR61		ΔR62		ΔR63	
	F-Ratio	P	F-Ratio	P	F-Ratio	P
ΔEA	31.305	<.001	16.143	<.001	46.166	<.001
ΔER	30.121	<.001	15.632	<.001	40.38	<.001
ΔCR	3.239	.07	31.894	<.001	44.086	<.001
Δ(ER-ΔI)	4.469	.033	.01	NS*	.224	NS
	ΔR64		ΔR65		ΔR66	
	F-Ratio	P	F-Ratio	P	F-Ratio	P
ΔEA	42.86	<.001	113.05	<.001	11.418	<.001
ΔER	41.421	<.001	80.803	<.001	9.219	.003
ΔCR	17.641	<.001	21.442	<.001	3.599	.056
Δ(ER-ΔI)	3.711	.052	.215	NS	.054	NS
	ΔR67		ΔR68		ΔR69	
	F-Ratio	P	F-Ratio	P	F-Ratio	P
ΔEA	47.652	<.001	2.531	.109	.622	NS
ΔER	14.259	<.001	3.385	.064	.193	NS
ΔCR	5.503	.019	1.669	.195	3.385	.064
Δ(ER-ΔI)	.071	NS	.283	NS	2.22	.134

* NS is no solution, i.e., the probability that the estimated regression equation is due to chance is greater than 30 per cent.

Zero correlations such as these represent statistical independence; they permit no prediction beyond chance, which is the ultimate of ignorance, and for all practical purposes, eliminate tentative working hypotheses.[1]

These results are consistent with the a priori expectations. By using a one-year time lag, the tests explicitly assumed inefficiencies in the market and the possibility of earning abnormal returns with publicly available information. Obviously, the speed with which the market reacts to information utterly negates this possibility. Suffice it to say, the efficient market hypothesis in its semi-strong form is not confuted and the usefulness of the alternative accounting flow variables within such an environment does not lie in their ability to predict future market performance. Therefore, the tests of the data over concurrent periods are considered.

RESULTS OF THE CONTEMPORANEOUS ASSOCIATION TESTS

The results of the concurrent tests are shown in Tables IV and V. These tests were designed to measure the degree of contemporaneous association between the alternative flow variables and the risk-adjusted rate of return. Specifically, the dependent variable for holding period t was regressed on the independent variable for the same earnings period t, and all holding periods were of one year's length.

The coefficients of determination explaining variation in ΔR

---

[1] John H. Mueller and Karl F. Schuessler, Statistical Reasoning in Sociology (Boston: Houghton Mifflin Company, 1961), p. 335.

by movements in ΔEA, ΔER, ΔCR, and Δ(ER-ΔI) respectively, for the years 1961 through 1967, range as shown below.

Independent Variable	r^2 High	Low
ΔEA	.3220	.0458
ΔER	.2534	.0373
ΔCR	.1563	.0134
Δ(ER-ΔI)	.0184	.0000

The results of the 1968 and 1969 regressions show no correlation whatsoever, and the implications of these findings are discussed separately, later in the chapter.

Clearly, ΔEA explained more variation in the data than the other income flow variables for every year except 1962. Also, the f-tests performed on ΔEA indicate that every one of the regressions, 1961-1967, was significant; that is, there was a <.001 probability that these f-ratios could have been observed if no linear relationship existed. In addition, the f-tests performed on ΔER indicate that every one of these regressions (1961-1967) was also significant at the <.001 level except for 1966, which was significant at the .003 level. This suggests that both ΔEA and ΔER produce estimated regression coefficients which should be retained as a basis to explain ΔR. Since ΔEA had a lower standard error of estimate (not shown here) and was able to explain more variation in ΔR for the years 1961-1967, it is concluded that ΔEA was more closely associated with ΔR than was ΔER, and the first hypothesis, which states that EA is more useful to investors in common stock than ER for predicting the risk-adjusted rate of return cannot be rejected.

The third accounting variable ΔCR produced regression results which were significant at the <.001 level for the years 1962-1965,

a 1961 level of .07, a 1966 level of .056, and a 1967 level of .019. The estimates of the regression equations for the years 1962-1965 obviously were highly significant, indicating that ΔCR is associated with ΔR. However, since ΔEA had a lower standard error of estimate and a higher r^2 than ΔCR for every year except 1962, it is concluded that ΔEA was more closely associated with ΔR than was ΔCR. Since ΔER also had a lower standard error of estimate and a higher r^2 than ΔCR for every year except 1962 and 1963, it is concluded that ΔER was also more closely associated with ΔR than was ΔCR. Thus, the second hypothesis, which states that ER or EA is more useful to investors in common stock than CR for predicting the risk-adjusted rate of return cannot be rejected.

The fourth accounting variable Δ(ER-ΔI) did not produce any estimates of the regression equation which were significant at the <.001 level. The f-ratios ranged from .033 to greater than .30 (no solution). In addition, Δ(ER-ΔI) had the highest standard error of estimate and the lowest r^2 values of all the accounting variables. Therefore, the third hypothesis, which states that ER or EA is more useful to investors in common stock than (ER-ΔI) for predicting the risk-adjusted rate of return cannot be rejected.

For the period extending from 1961-67, the a priori expectations of a contemporaneous association are confirmed. However, the findings are contrary to those suggested by the theory as evidenced by their inability to reject any of the three hypotheses. Specifically the findings indicate that the market reacted more strongly to those economic events impounded by the net income available to common stockholders (EA) variable than it did to the economic events reflected by the alternative accounting variables suggested by the theory. This is consistent with the results of

the Ball and Brown study and others. Ball and Brown were able to conclude that neither cash flow as approximated by operating income, nor net income before nonrecurring items was as successful in predicting the signs of the stock return residuals (risk-adjusted rates of return) as net income and earnings per share.[2] Further comparison with the Ball and Brown study is inappropriate because they examined only the relationship between the sign of the unexpected income change and the associated risk-adjusted rate of return. This study has considered both the signal and the magnitudinal aspects of the relationship. Furthermore, this study examined actual income changes rather than expected income changes.

The poor showing of the cash flow variable (ΔCR) conflicts with the findings of Staubus who provided evidence to support the notion that changes in cash flow are good indicators of wealth changes and are not obscured by accountants trying to measure depreciation.[3] Perhaps the market participants were sufficiently sophisticated to realize that capital recovery is essential to continued operations and viewed depreciation accounting as useful in the sense that it excludes revenues to the extent of the annual depreciation charge from taxable income. However, the fourth accounting variable $\Delta(ER-\Delta I)$ which substituted purchases for cost-of-goods-sold had no association at all with ΔR and this is corroborated by another Staubus study which concluded that flow variables

---

[2]Ray Ball and Philip Brown, "An Empirical Evaluation of Accounting Income Numbers," Journal of Accounting Research, Vol. 6 (Autumn, 1968), pp. 172-3.

[3]George J. Staubus, "The Association of Financial Accounting Variables with Common Stock Values," The Accounting Review, Vol. XL, No. 1 (January, 1965), pp. 119-34, _____, "Statistical Evidence of the Value of Depreciation," Abacus, Vol. 3, No. 1 (August, 1967), pp. 3-22.

relying on inventory accounting are more closely associated to discounted common stock values than comparable data not based on such accounting.[4] More generally though, the intrinsic value model used by Staubus in the three empirical investigations cited herein, is not as appealing as the model used in this study because the Staubus model does not adequately deal with the risk factor.

It is interesting to note that all of the published empirical investigations which examined the relationship between accounting data and market movements used pre-1967 data. In most instances this is due to the fact that the Price Data File maintained by the Center for Research in Security Prices at the University of Chicago does not contain monthly price relatives beyond 1965. More importantly, however, these studies provided evidence which demonstrated that a correspondence existed between accounting numbers and price movements.[5] The evidence showed that the price movements that preceded the earnings announcements were in anticipation of the information contained in the accounting numbers, and that by the time the earnings were actually released, stock prices had already completed most of the necessary adjustment.

Consider now the results of the regressions using 1968 and 1969 data. They indicate approximately zero correlation for all the accounting variables. The explaining power of the variables is totally absent and

---

[4]George J. Staubus, "Testing Inventory Accounting," The Accounting Review, Vol. XLIII, No. 3 (July, 1968), pp. 413-24.

[5]Ball and Brown, op. cit., pp. 159-78; William H. Beaver, "The Information Content of Annual Earnings Announcements," Empirical Research in Accounting: Selected Studies, 1968, Supplement to The Journal of Accounting Research, Vol. VI (Chicago: Institute of Professional Accounting, 1969), pp. 67-92.

none of the estimated regression equations are significant at the <.001 level. The data from the years 1961 through 1967 showed that there was a relationship between market movements and accounting flows, admittedly not a strong relationship, but one that was due to more than chance alone; and then suddenly the estimated regressions for 1968 and 1969 showed no relationship existing at all.

Economic conditions existing in 1968 and 1969 were not substantially different from those existing prior to 1968. Expansion of the Nation's economy was virtually uninterrupted for the entire 1960's decade. The year 1968 was the eighth year of the long cyclical upswing that began early in 1961 and that was interrupted briefly in early 1967.[6] In 1968 employment rose to its highest level ever, and the unemployment rate fell to its lowest level in fifteen years.[7] In 1969, real growth was modest and expansion slowed as the years progressed.[8] In 1969, labor productivity declined, profits were squeezed and costs and prices continued to decline despite intense efforts to stem inflation.[9] The pressures generated by very substantial fiscal and monetary restraint were a dominant feature of 1969, and the interval since the latter part of 1968 marked the first sustained period in recent years during which

---

[6] U. S. Department of Commerce, Survey of Current Business, Vol. 49, No. 1 (Washington: Government Printing Office, January 1969), p. 1.

[7] Ibid.

[8] U. S. Department of Commerce, Survey of Current Business, Vol. 50, No. 1 (Washington: Government Printing Office, January, 1970), p. 11.

[9] Ibid.

fiscal and monetary policies were unambiguously operating in the same direction, and a clear deceleration of the economy's growth was in fact achieved.[10]

Capital spending in producers' durable equipment and non residential construction in 1968 showed only a moderate gain for the second successive year.[11] Capital spending in 1969 was a major expansionary force as it had been earlier in the sixties.[12] After four years of booming growth, spending had stabilized in 1967, but a renewal of growth developed during 1968 and the 1969 increase was substantial.[13]

In marked contrast to the two preceding years, when inventory investment constituted a dynamic element in the economy, business accumulation of inventories in 1968 was not a significant source of change in GNP, in fact, it was only about one and one-half billion more than the 1967 accumulation.[14] Inventory accumulation by business was somewhat greater in 1969 than in 1968, and accounted for approximately $700 million of the total expansion in GNP for 1969.[15]

---

[10] Ibid.

[11] U. S. Department of Commerce, Survey of Current Business, Vol. 49, No. 1, p. 10.

[12] U. S. Department of Commerce, Survey of Current Business, Vol. 50, No. 1, p. 13.

[13] Ibid.

[14] U. S. Department of Commerce, Survey of Current Business, Vol. 49, No. 1, p. 13.

[15] U. S. Department of Commerce, Survey of Current Business, Vol. 50, No. 1, p. 15.

In comparing 1968-1969 economic conditions with economic conditions existing prior to 1968, one is not impressed with the differences in growth, capital spending, inventory accumulation, employment, and other key indicators of the economic well-being of the country. However, one is impressed with the extent to which inflation has grown subsequent to 1965. For instance, the Nation's output of goods and services in 1969 had a value of 932 1/4 billion at market prices, up 66 1/2 billion or 7 3/4 percent from 1968, while physical volume grew less than 3 percent.[16] Stripped of the effects of inflation, the Nation's aggregate output was at a virtual standstill.[17] An awareness of the seriousness of the problem of inflation caused both fiscal and monetary authorities to make a concerted effort to stem the tide of inflationary pressures. This policy began in 1968, but the real brakes were applied in 1969, yet prices continued upward, demand slackened and profits were squeezed.

The 1961-1969 period was basically the same, essentially bullish, yet the results of the tests showed that no concurrent relationship existed between market movement and accounting flows in 1968 and in 1969. It would appear then that annual accounting earnings information prepared from unadjusted historical costs may not reflect the underlying economic events satisfactorily to the market participants, who have become more aware of the impact of inflation on reported profits. This is only one possible explanation for the apparent lack of correlation

---

[16] Ibid. p. 11.

[17] Ibid.

between the 1968 and 1969 data. Other possible explanations hinge on the appropriateness of the models, the ability of the ordinary least squares regression model to convey the underlying relationships and the assumption of a stationary beta. Shortcomings in each of these "techniques" could account for the unexpected 1968-69 results. In the final analysis, the strongest statement that can be offered is that if a relationship did in fact exist, the models used herein were inadequate to convey that relationship. Two further possible explanations are offered below.

The efficient market hypothesis does not state that the market adjustment to new information is necessarily accurate; rather, the hypothesis suggests that if the future financial events which are anticipated from current information fail to materialize, price corrections will occur.[18] Therefore, if annual financial statements, for example, are not a reasonable precursor of selected future financial events and the market finds itself continually having to correct, at some point in time it will simply ignore the statements.[19] Therefore, the lack of correspondence between the market and the accounting flow variables may exist because investors have turned to alternative information sources which have yielded superior prognostications about future economic events. These sources either report events not reported by the annual accounting statements and augur different future financial events than those indicated by the statements or these sources report the same events as do annual accounting statements but

---

[18] Lawrence Revsine, "Predictive Ability, Market Prices, and Operating Flows," The Accounting Review, Vol. XLVI, No. 3 (July, 1971), p. 485.

[19] Ibid., pp. 485-486.

disclose them in such a manner than investors reach different conclusions of the future impact of these events. In either case, the market views accounting reports as misleading and the fact that investors have turned to alternative information sources reflects "learning" on the part of the market participants.[20]

A second possible explanation of the lack of association stems not from the notion of "misleading statements" but from testing the data over wrong time periods. Rather than test the data over concurrent time periods, the possibility of various lagged relationships, where the accounting data lags the market performance, should be investigated. For example, the risk-adjusted rate of return from a holding period extending from 12/1/70 thru 11/30/71 would be examined in conjunction with accounting data from operations extending from 1/1/71 thru 12/31/71, a one month lag. The existence of this type of relationship would imply that market participants not only anticipate the results of operations, but anticipate them a month ahead of time.

The possibility that the market has turned to other sources which are more informative and more timely than the annual reports is very real. The annual reports typically are issued about one and one-half months subsequent to the fiscal year end.[21] The thousands of investors who participate in the market (and the number of knowledgeable investors has increased subsequent to 1967) have turned to and indeed fostered alternative information sources concerning economy-wide events, industry-wide events and

---

[20] Revsine, op. cit., p. 486.

[21] Ball and Brown, op. cit., p. 167, found that for the year ended 12/31/65, 25 percent of the income reports had been announced by 1/31/66, 50 percent by 2/8/66, and 75 percent by 2/21/66.

individual company events. These sources include industrial production reports, national income reports, reports on industrial prices, reports on stabilization policies (e.g., reports on the policies of the Federal Reserve Board), forecasts that emanate from trade-groups, statements made by corporate officials regarding their firms' operations, releases issued by brokerage firms, releases issued by market-newsletter services, registrations with the S.E.C., reports on changes in a firm's management, information leakages, and the outputs of prediction models, inter alia.[22]

Further work must be done which evaluates accounting data in conjunction with these data sources; more specifically, the accounting data must be examined to see if they reflect the same underlying events as do the other sources because if in fact the market views the information contained in the annual accounting reports as misleading, there are very serious implications for the accounting profession. Consider the following remarks of Revsine:

> Recently, the accountant's income determination process has been the subject of many critical and (to some nonaccountants) highly illuminating articles in the financial literature. To the extent that these articles have alerted investors to certain deficiencies of the traditional model as a forecast basis and to the manipulative potential occasioned by alternative accounting principles, one could posit that the market would react more warily to future accounting data.[23]

The existence of such a condition could oblige the accounting profession to achieve greater uniformity for comparability and if this were deemed insufficient by the market, whole new models for the determination of

---

[22] Nicholas J. Gonedes, "Efficient Markets and External Accounting," The Accounting Review, Vol. XLVII, No. 1 (January, 1972), pp. 15-16.

[23] Revsine, op. cit., p. 486.

income would have to be devised, models which may perforce sacrifice objectivity for usefulness. Given that the accounting profession is willing and able to generate these models, clearly, a concerted effort should be made to accelerate the release of the annual report so that it would be timely in the sense of divulging new information and at the very least, the annual report can still be justified on the basis of providing supportive and corroborative evidence for equilibrium market prices.

CONCLUDING REMARKS

The study provided evidence showing that none of the alternative accounting variables, as developed by the theory, possessed the ability to predict future market performance better than the presently accepted income model. The inability of annual accounting flow data to predict future market performance was anticipated because of the high likelihood of the existence of an efficient market. Confirmation of expectations was based on the approximately zero correlation existing between the accounting variables and the risk-adjusted rate of return accruing from a future holding period. The findings do not conflict with the efficient market hypothesis. In fact they corroborate the hypothesis by demonstrating that publicly available information cannot be used to predict future market performance. Fundamental analysis of accounting data by investors simply will not provide the information necessary to obtain abnormal returns, given present market conditions.

In addition, the study, in conjunction with others, provided evidence that market movements reflected the same underlying events as did reported earnings for the one year periods extending from 196' through

1967. This conclusion is based on the observed contemporaneous association between the alternative accounting flow variables and the operational measure of rate of return. Although the a priori expectations of contemporaneous association were confirmed, the findings were contrary to those suggested by the theory. The results indicated that net income available to common shareholders (EA) had the closest association, followed in turn by net recurring income (ER) and current recurring flow. (ER-ΔI) exhibited no association at all. The tests of contemporaneous association using 1968 and 1969 data indicated that no relationship existed between any of the accounting variables and the operational measure of rate of return.

The findings infer that accounting data does not provide investors with the necessary information for common stock investment decisions. The existence of efficient markets precludes the possibility of the data having future predictive ability. The findings may also imply that investors are aware of this fact and, as a result, have turned to other information sources which are more timely and are considered to provide more useful prognostications. Since present financial accounting information may not be fulfilling this need of the investors, another justification for the annual report will have to be forthcoming. Such a justification may be that the annual report provides supportive evidence for equilibrium market prices. The results of the contemporaneous association tests for the 1961-1967 period indicated that accounting data was furnishing this kind of corroborative support for market prices during that period. However, tests on the most recent data (1968-1969) indicated that the accounting data was not even useful within the context of

providing confirmative evidence for stock price movements.

Further work must be done which evaluates accounting data in conjunction with competing data sources. This necessary first step will provide some insight into the causes behind the lack of association between the accounting data and market movements. The possible explanations offered in this study can be summarized as follows:

The annual accounting flow data impounds the same underlying events as those impounded by alternative data sources, but due to the effects of inflation the market does not view the present model for the determination of annual income as satisfactorily reporting those events.

The more cogent explanation is that annual accounting data do not impound the same underlying events as the alternative sources. The market participants are apprised of this fact and view accounting data a non-useful data source. If either of these two conditions exist in fact, they pose a dire threat to the future development of the accounting profession.

Finally, of course, there is the possibility that the relationships being sought in this study do in fact exist, but that the techniques used to convey those relationships were simply inappropriate.

Nevertheless, the accounting profession and specifically those who set the standards for reporting the results of operation, in light of the results of this study and the suggested explanations of those results, might seriously consider issuing a caveat averring that the traditional "all-purpose" statements may not be fulfilling the informational needs of the individual investor.

B I B L I O G R A P H Y

BOOKS

American Institute of Certified Public Accountants. Accounting Trends and Techniques. 25th ed. New York: American Institute of Certified Public Accountants, 1971.

_____. Accounting Trends and Techniques. 18th ed. New York: American Institute of Certified Public Accountants, 1964.

Archer, Stephen H., and Charles D'Ambrosio (eds.). The Theory of Business Finance: A Book of Readings. New York: The Macmillan Co., 1967.

Baumol, William J. Economic Theory and Operations Analysis. 2d ed. Englewood Cliffs: Prentice-Hall, Inc., 1965.

Bedford, Norton. Modern Accounting. New York: The Ronald Press Co., 1968.

Bonini, Charles P. Simulation of Information and Decision Systems in the Firm. Englewood Cliffs: Prentice-Hall, Inc., 1963.

Brealey, Richard A. An Introduction to Risk and Return from Common Stocks. Cambridge: The M.I.T. Press, 1969.

Burford, Roger. Statistics, A Computer Approach. Columbus: Charles E. Merrill Publishing Co., 1968.

Canning, John B. The Economics of Accountancy. New York: The Ronald Press Co., 1929.

Chambers, Raymond J. Accounting, Evaluation and Economic Behavior. Englewood Cliffs: Prentice-Hall, Inc., 1966.

Chou, Ya-lun. Applied Business and Economic Statistics. New York: Holt, Rinehart and Winston, Inc., 1963.

Committees on Accounting Procedure and Accounting Terminology. Accounting Research and Terminology Bulletins. Final ed. New York: American Institute of Certified Public Accountants, 1961.

Committee on Accounting Terminology. Accounting Terminology Bulletin No. 1, Review and Resume. New York: American Institute of Accountants, 1953.

Committee to Prepare a Statement of Basic Accounting Theory. A Statement of Basic Accounting Theory. Evanston: American Accounting Association, 1966.

Draper, N. R., and H. Smith. Applied Regression Analysis. New York: John Wiley and Sons, Inc., 1968.

Edgeworth, Francis Y. Mathematical Psychics. London: C. K. Paul & Co., 1881.

Edwards, Edgar O., and Philip W. Bell. The Theory and Measurement of Business Income. Berkeley and Los Angeles: The University of California Press, 1961.

Francis, Jack C., and Stephen H. Archer, Portfolio Analysis. Englewood Cliffs: Prentice-Hall, Inc., 1971.

Fredrickson, Bruce E. (ed.). Frontiers of Investment Analysis. 2d ed. Scranton: International Textbook Co., 1971.

Friedman, Milton. Essays in Positive Economics. Chicago: Univeristy of Chicago Press, 1953.

Gilman, Stephen. Accounting Concepts of Profit. New York: The Ronald Press Co., 1939.

Goldberg, Louis. Concepts of Depreciation. Melbourne: Harston Patridge and Company, 1960.

Graham, Benjamin, David L. Dodd, and Sidney Cottle. Security Analysis, Principles and Techniques. 4th ed. New York: McGraw Hill Book Co., 1962.

Hendriksen, Eldon S. Accounting Theory. Revised ed. Homewood, Illinois: Richard D. Irwin, Inc., 1970.

Jaedicke, Robert K., and Robert T. Sprouse. Accounting Flows: Income, Funds, and Cash. Englewood Cliffs: Prentice-Hall, Inc., 1965.

_____, Y. Ijiri, and O. Nielsen (eds.). Research in Accounting Measurement, AAA Collected Papers. Menasha: George Banta Co., 1966.

Knight, Frank H. Risk, Uncertainty and Profit. Chicago: University of Chicago Press, 1971.

Latane, Henry A., and Donald L. Tuttle. Security Analysis and Portfolio Management. New York: The Ronald Press Co., 1970.

Leftwich, Richard H. The Price System and Resource Allocation. 3d ed. New York: Holt, Rinehart and Winston, Inc., 1966.

Littleton, A. C. Accounting Evolution to 1900. New York: Russell and Russell, a division of Atheneum House, Inc., 1966.

_____. Structure of Accounting Theory. Evanston: American Accounting Association, 1953.

May, George O. "Improvement in Financial Accounts," Dickenson Lectures in Accounting. Cambridge: Harvard University Press, 1943.

Markowitz, Harry. Portfolio Selection: Efficient Diversification of Investments. New York: John Wiley and Sons, 1959.

Mueller, John H., and Karl F. Schuessler. Statistical Reasoning in Sociology. Boston: Houghton Mifflin Co., 1961.

Paton, W. A. Accounting Theory. New York: The Ronald Press Co., 1922.

Salmonson, R. F. Basic Financial Accounting Theory. Belmont, California: Wadsworth Publishing Co., 1969.

Sanders, T. H., H. R. Hatfield, and U. Moore. A Statement of Accounting Principles. New York: American Institute of Accountants, 1938.

Simons, Harry. Intermediate Accounting, Comprehensive volume. 5th ed. Cincinnati: South-Western Publishing Co., 1972.

Staubus, George J. A Theory of Accounting to Investors. Berkeley: University of California Press, 1961 (Reissued Lawrence, Kansas: Scholars Book Co., 1971).

Sterling, Robert R. Theory of the Measurement of Enterprise Income. Lawrence, Kansas: The University Press of Kansas, 1970.

Study Group on Business Income. Changing Concepts of Business Income. New York: The MacMillan Co., 1952.

Sweeney, Henry. Stabilized Accounting. New York: Harper & Co., 1936.

Von Neumann, John, and Oskar Morgenstern. Theory of Games and Economic Behavior. 2d ed. Princeton: Princeton University Press, 1947.

Williams, John Burr. The Theory of Investment Value. Cambridge: Harvard University Press, 1938.

ARTICLES

Altman, Edward I. "Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy," The Journal of Finance, XXIII (September, 1968), 589-609.

Ball, Ray, and Philip Brown. "Some Preliminary Findings on the Association between the Earnings of a Firm, Its Industry, and the Economy," Empirical Research in Accounting: Selected Studies, 1967, Supplement to Vol. 5, Journal of Accounting Research. Chicago: Institute of Professional Accounting, 1968.

_____. "An Empirical Evaluation of Accounting Income Numbers," Journal of Accounting Research, 6 (Autumn, 1968), 159-178.

_____. "Index of Empirical Research in Accounting," Journal of Accounting Research, 9, No. 1 (Spring, 1971), 1-31.

Beaver, William H. "Financial Ratios as Predictors of Failure," Empirical Research in Accounting: Selected Studies, 1966, Supplement to Vol. 4, Journal of Accounting Research. Chicago: Institute of Professional Accounting, 1967.

_____. "The Information Content of Annual Earnings Announcements," Empirical Research in Accounting: Selected Studies, 1968, Supplement to Vol. 6, Journal of Accounting Research. Chicago: Institute of Professional Accounting, 1969.

_____. "The Time Series Behavior of Earnings," Empirical Research in Accounting: Selected Studies, 1970, Supplement to Vol. 8, Journal of Accounting Research. Chicago: Institute of Professional Accounting, 1971.

_____, J. Kennelly, and W. Voss. "Predictive Ability as a Criterion for Evaluating Accounting Data," The Accounting Review, XLIII, No. 4 (October, 1968), 675-683.

_____, P. Kettler, and M. Scholes. "The Association between Market Determined and Accounting Determined Risk Measures," The Accounting Review, XLV, No. 4 (October, 1970), 654-682.

Bruns, William J. "Inventory Valuation and Management Decisions," The Accounting Review, XL, No. 2 (July, 1965), 345-359.

Cohen, K. J., and J. A. Pogue. "An Empirical Evaluation of Alternative Selection Models," Journal of Business, XL, No. 2 (April, 1967), 166-193.

Committee on Accounting Theory Construction and Verification. "Report of the Committee on Accounting Theory and Verification," The Accounting Review, Supplement to XLVI (1971), 51-79.

Committee on Concepts and Standards - Long Lived Assets. "Accounting for Land, Buildings and Equipment," Supplementary Statement No. 1, The Accounting Review, XXXIX (July, 1964), 693-699.

Dyckman, Thomas R. "On the Investment Decision," The Accounting Review, XXXIX, No. 2 (April, 1964), 285-295.

Executive Committee of the American Accounting Association. "Accounting Concepts and Standards Underlying Corporate Financial Statements," The Accounting Review, XXIII, No. 4 (October, 1948), 339-344.

Fama, Eugene F. "The Behavior of Stock Market Prices," Journal of Business, XXXVII (January, 1965), 34-105.

_____. "Portfolio Analysis in a Stable Paretian Market," Management Science, XI (January, 1965), 404-419.

_____. "Risk, Return and Equilibrium: Some Clarifying Comments," Journal of Finance, XXIII, No. 1 (March, 1968), 29-40.

_____. "What Random Walk Really Means," The Institutional Investor, II (April, 1968), 38-40.

_____. "Efficient Capital Markets: A Review of Theory and Empirical Work," Journal of Finance, XXV (May, 1970), 383-417.

_____, L. Fisher, M. Jensen, and R. Roll. "The Adjustment of Stock Prices to New Information," International Economic Review, X (February, 1969), 1-21.

Fisher, Lawrence. "Some New Stock Market Indexes," Journal of Business, XXXIX (January, 1966), 191-225.

Friedman, Milton, and Leonard J. Savage. "The Utility Analysis of Choice Involving Risk," The Journal of Political Economy, LVI, No. 4 (August, 1948), 279-304.

Gonedes, Nicholas J. "Efficient Capital Markets and External Accounting," The Accounting Review, XLVII, No. 1 (January, 1972), 11-21.

Grady, Paul. "Depreciation -- "To Measure Income or Provide Funds for Replacement?" N.A.A. Bulletin, 40 (August, 1959), 56-63.

Hicks, John R., and R. G. D. Allen. "A Reconsideration of the Theory of Value," Economica (February, May, 1934), 52-76, 196-219.

Hirschleifer, Jack. "Efficient Allocation of Capital in an Uncertain World," American Economic Review (May, 1964), 77-85.

Jensen, Michael C. "Risk, the Pricing of Capital Assets, and the Evaluation of Investment Portfolios," Journal of Business, XLII, No. 2 (April, 1968), 167-185, 192-202, 241-247.

Jensen, Robert E. "An Experimental Design for Study of Effects of Accounting Variations in Decision Making," Journal of Accounting Research, 4 (Autumn, 1966), 224-238.

Keynes, John M. "Economic Possibilities for Our Grandchildren," Saturday Evening Post, October 11, 1930, pp. 27, 160-162.

King, Benjamin F. "Market and Industry Factors in Stock Price Behavior," Supplement to the Journal of Business, XXXIX (January, 1966), 139-190.

Lintner, John. "The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets," Review of Economics and Statistics, XLVII (February, 1965), 13-37.

_____. "Security Prices, Risk and Maximal Gains from Diversification," Journal of Finance, XX (December, 1965), 587-616.

Lorie, James H. "Four Cornerstones of a New Investment Policy," The Institutional Investor (November, 1971), 48-50, 85-86.

Mandelbrot, Benoit. "The Variation of Certain Speculative Prices," Journal of Business, XXXVI (October, 1963), 394-419.

Markowitz, Harry. "Portfolio Selection," Journal of Finance, VII, No. 1 (March, 1952), 77-91.

Mattlin, Everett. "The Days of the Numbers Game are Numbered," The Institutional Investor (November, 1971), 35-41, 68-71.

Mlynarczyk, Francis A. "An Empirical Study of Accounting Methods and Stock Prices," Empirical Research in Accounting: Selected Studies, 1969, Supplement to Vol. 7, Journal of Accounting Research. Chicago: Institute of Professional Accounting, 1970.

Modigliani, Franco, and Merton H. Miller. "Some Estimates of the Cost of Capital to the Electric Utility Industry," The American Economic Review, LVI (June, 1966), 333-391.

Mossin, Jan. "Equilibrium in a Capital Asset Market," Econometrica, XXXIV (October, 1966), 768-782.

_____. "Optimal Multiperiod Portfolio Policies," The Journal of Business, 41, No. 2 (April, 1968), 215-229.

Nerlove, Marc. "Factors Affecting Differences Among Rates of Return on Investments in Individual Stocks," The Review of Economics and Statistics, L, No. 3 (August, 1968), 312-331.

O'Donnell, J. L. "Relationships between Reported Earnings and Stock Prices in the Electric Utility Industry," The Accounting Review, XL (January, 1965), 135-143.

_____. "Further Observations on Reported Earnings and Stock Prices," The Accounting Review, XLIII (July, 1968), 549-553.

Pratt, J. W. "Risk Aversion in the Small and the Large," Econometrica XXXII (January - April, 1964), 122-136.

Revsine, Lawrence. "Predictive Ability, Market Prices and Operating Flows," The Accounting Review, XLVI, No. 3 (July, 1971), 480-489.

Robichek, Alexander A. "Risk and the Value of Securities," Journal of Financial and Quantitative Analysis, IV, No. 4 (December, 1969), 513-538.

Sharpe, William F. "A Simplified Model for Portfolio Analysis," Management Science, IX (January, 1963), 277-293.

_____. "Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk," Journal of Finance, XIX, No. 3 (September, 1964), 425-442.

Sommer, L. (trans.). "Exposition of a New Theory on the Measurement of Risk," by Daniel Bernoulli, Econometrica, XXII (1954), 23-26.

Soujanen, Waino W. "Lifo as a Spur to Inflation - The Recent Experience of Cooper," The Accounting Review, XXXII (January, 1957), 42-50.

Staubus, George J. "The Association of Financial Accounting Variables with Common Stock Values," The Accounting Review, XL (January, 1965), 119-134.

_____. "Statistical Evidence of the Value of Depreciation Accounting," Abacus, 3 (August, 1967), 3-22.

_____. "Testing Inventory Accounting," The Accounting Review, XLIII, No. 3 (July, 1968), 413-424.

Sterling, Robert R. "On Theory Construction and Verification," The Accounting Review, XLV, No. 3 (July, 1970), 444-457.

Tobin, James. "Liquidity Preference as Behavior Toward Risk," Review of Economic Studies, XXV (2), No. 67 (February, 1958), 65-86.

Wallingford, B. A. "A Survey and Comparison of Portfolio Selection Models," Journal of Financial and Quantitative Analysis (June, 1967), 85-106.

OTHER

Accounting Principles Board. Reporting the Results of Operations. Opinion No. 9. New York: American Institute of Certified Public Accountants, December, 1966.

_____. Reporting Changes in Financial Position. Opinion No. 19. New York: American Institute of Certified Public Accountants, March, 1971.

Arthur Young & Company. The Objective of Financial Statements: Responding to Investors' Needs. A paper presented to the Accounting Objectives Study Group. New York: Arthur Young & Co., May, 1972.

Beaver, William H. "The Behavior of Security Prices and Its Implication for Accounting Research (Methods)." Working Paper No. 203. Graduate School of Business, Stanford University, May, 1971.

_____, and Roland E. Dukes. "Interperiod Tax Allocation and the Behavior of Security Prices." Research Paper No. 7. Graduate School of Business, Stanford University, May, 1971.

Blume, Marshall. "The Assessment of Portfolio Performance - An Application to Portfolio Theory." Unpublished Ph.D. dissertation, University of Chicago, 1968.

_____, and Irwin Friend. "A New Look at the Capital Asset Pricing Model." Symposium on Methodology in Finance-Investments, Rutgers University, Center for Continuing Education, May 13-14, 1971.

Board of Governors, Federal Reserve System. Federal Reserve Bulletin, Vol. 49, No. 1 (January, 1963), p. 48.

_____. Federal Reserve Bulletin, Vol. 57, No. 1 (January, 1971), p. A33.

Brigham, Eugene F. "Depreciation and Reported Profits: The Effects of Alternative Accounting Policies on Utility Rates and on Utility and Non-Utility Companies' Reported Profits." Los Angeles: University of California at Los Angeles, 1966. (Mimeographed).

Fama, Eugene F. "Multi-Period Consumption-Investment Decisions." Report No. 6803. Chicago: University of Chicago Center for Mathematical Studies in Business and Economics, 1968.

_____. "Risk, Return, and Equilibrium." Report No. 6831. Chicago: University of Chicago Center for Mathematical Studies in Business and Economics, 1968.

Hakansson, Nils H. "Optimal Investment and Consumption Strategies for a Class of Utility Functions." Working Paper 101. Los Angeles: Western Management Science Institute, 1966.

Mason, Perry. "Cash Flow" Analysis and the Funds Statement. Accounting Research Study No. 2. New York: American Institute of Certified Public Accountants, 1961.

Merrill, Lynch, Pierce, Fenner and Smith. Stock Portfolio - Market Sensitivity Summary, Findings and Suggestions. Unpublished material, 1971.

Moonitz, Maurice. The Basic Postulates of Accounting. Accounting Research Study No. 1. New York: American Institute of Certified Public Accountants, 1961.

Roll, Richard. "The Efficient Market Model Applied to U. S. Treasury Bill Rates." Unpublished Ph.D. dissertation, University of Chicago, 1968.

Siebel, Jerry D. "An Empirical Investigation of the Usefulness to Investors of Published Annual Financial Statements." Unpublished Ph.D. dissertation, University of Iowa, 1970.

Sprouse, Robert T., and Maurice Moonitz. A Tentative Set of Broad Accounting Principles for Business Enterprises. Accounting Research Study No. 3. New York: American Institute of Certified Public Accountants, 1962.

Standard and Poor's. Trade and Securities Statistics Security Price Index Record. 1968 ed., New York: Standard and Poor's Corp., 1968.

_____. Trade and Securities Statistics Current Statistics. Vol. 37, No. 10 (October, 1971), p. 31.

_____. Compustat Tape of Primary 900 Industrial Companies.

Thomas, Arthur L. The Allocation Problem in Financial Accounting Theory. Studies in Accounting Research, No. 3. Evanston: American Accounting Association, 1969.

U. S. Department of Commerce. Survey of Current Business. Vol. 49, No. 1 (January, 1969). Washington: Government Printing Office, 1969.

_____. Survey of Current Business. Vol. 50, No. 1 (January, 1970). Washington: Government Printing Office, 1970.

U. S. Department of Commerce, Bureau of the Census. Business Conditions Digest, Series ES1 No. 71-5 (May, 1971), Washington, 1971.

Williamson, Peter J., and David H. Downes. Manuals for Computer Programs in Finance and Investments. 2d ed. Hanover: Trustees of Dartmouth College, 1971.

APPENDIX A

SECURITY RISK EVALUATION (BETA COEFFICIENTS) FOR 241 COMPANIES, COMPUTED FROM 60 MONTHLY OBSERVATIONS ENDING WITH DECEMBER 31, 1971. MERRILL, LYNCH, PIERCE, FENNER AND SMITH, INC.

TABLE A1

Security Risk Evaluation (Beta Coefficients) for 241 Companies, Computed from 60 Monthly Observations Ending with December 31, 1971. Merrill, Lynch, Pierce, Fenner and Smith, Inc.

Compustat I D	Company	Beta Coefficient
097383	Boise Cascade Corporation	1.71
373298	Georgia Pacific Corporation	1.01
962166	Weyerhaeuser Company	1.17
027465	American Metal Climax, Inc.	.77
117421	Brush Beryllium Company	1.83
186000	Cleveland Cliffs Iron Company	1.09
344892	Foote Mineral Company	1.07
460056	International Nickel Co. of Canada	.85
858331	Steep Rock Iron Mines	1.19
200435	Cominco Ltd.	.37
790155	St. Joe Minerals Corporation	.83
134411	Campbell Red Lake Mines	-.01
374586	Giant Yellowknife Mines	.34
437614	Homestake Mining	-.02
276461	Eastern Gas & Fuel Association	1.47
656780	North American Coal	1.36
054897	Aztec Oil & Gas	1.63
257093	Dome Petroleum Ltd.	1.94
598342	Midwest Oil Corporation	.49
868273	Superior Oil Company	1.59
882474	Texas Gulf Sulphur Company, Inc.	1.56
487836	Kellogg Company	.59
099599	Borden, Inc.	.96
143483	Carnation, Inc.	.61
252435	DiGiorgio Corporation	1.96
126149	C.P.C. Intl. Inc.	.69
370064	General Host Corporation	2.01
460754	Interstate Brands	.63
487242	Keebler Company	.81
629527	Nabisco, Inc.	.43
890516	Tootsie Roll Industries, Inc.	1.46
982526	Wrigley, Wm. Jr., Company	.73
045501	Associated Brewing Company	1.12
306855	Falstaff Brewing Corporation	1.55
693715	Pabst Brewing Company	.93
635655	National Distillers & Chem.	.78
256129	Dr. Pepper Company	1.05
024703	American Brands, Inc.	.61
718167	Philip Morris, Inc.	.98

TABLE A1 Continued

Compustat I D	Company	Beta Coefficient
006284	Adams Millis Corporation	2.32
189486	Cluett, Peabody & Company, Inc.	1.21
029465	American Seating Company	.98
042321	Armstrong Cork Company	1.26
608030	Mohasco Industries, Inc.	1.46
949085	Welbilt Corporation	2.09
460146	International Paper Company	1.32
582834	Mead Corporation	1.20
793453	St. Regis Paper Company	.91
809877	Scott Paper Company	.83
315711	Fibreboard Corporation	1.31
861589	Stone Container Corporation	.88
828879	Simplicity Pattern Company	1.15
887360	Times Mirror Company	1.47
615785	Moore Corporation	.59
853887	Standard Register Company	1.23
019087	Allied Chemical Corporation	1.35
025321	American Cyanamid Company	1.05
150843	Celanese Corporation	1.23
163600	Chemetron Corporation	1.40
237424	Dart Industries	1.34
252741	Diamond Shamrock Corporation	1.25
277461	Eastman Kodak Company	.78
302491	FMC Corporation	1.69
383883	Grace (W.R.) + Company	.87
427056	Hercules, Inc.	.93
500602	Koppers Company	1.10
604059	Minnesota Mining & Manufacturing Co.	1.18
629156	N L Industries	1.31
680665	Olin Corporation	1.87
709317	Pennwalt Corporation	1.34
759200	Reichhold Chemicals, Inc.	1.58
857721	Stauffer Chemical Company	1.32
905581	Union Carbide Corporation	1.05
010202	Akzona	1.27
002824	Abbott Laboratories	.69
071833	Baxter Laboratories	1.13
110097	Bristol-Meyers Company	.94
375766	Gillette Company	1.07
478160	Johnson & Johnson	.73
532457	Lilly Eli Company	.57
589331	Merck & Company	.69
717081	Pfizer, Inc.	1.05
806605	Schering Plough	.73
832135	Smith Kline & French Lab.	.92
859264	Sterling Drug, Inc.	1.08

TABLE A1 Continued

Compustat I D	Company	Beta Coefficient
934488	Warner-Lambert Company	.89
194162	Colgate-Palmolive Company	1.00
303045	Factor Max Company	1.09
761525	Revlon, Inc.	.94
212867	Conwood Corporation	.73
257561	Domtar Ltd.	1.01
492746	Kewanee Oil Company	1.61
629853	Nalco Chemical Company	1.03
048825	Atlantic Richfield Company	1.38
173036	Cities Service Company	.50
565845	Marathon Oil Company	1.22
718507	Phillips Petroleum Company	1.06
822635	Shell Oil Company	1.00
826622	Signal Cos.	1.23
853700	Standard Oil Co. (Indiana)	1.04
853734	Standard Oil Co. Ohio	.72
907770	Union Oil Company of California	1.24
110889	British Petroleum Company Ltd.	.36
607080	Mobil Oil Corporation	.83
853683	Standard Oil Company of California	.84
881694	Texaco Inc.	.88
339711	Flintkote Company	1.81
636316	National Gypsum Company	1.90
770553	Robertson (H H) Company	1.15
216831	Cooper Tire & Rubber	1.00
382388	Goodrich (B F) Company	1.29
564402	Mansfield Tire & Rubber Company	1.72
608302	Mohawk Rubber Company	1.51
585786	Melville Shoe Corporation	.83
024843	American Can Company	.71
211183	Continental Can Company, Inc.	.90
228255	Crown Cork & Seal Company, Inc.	.79
690768	Owens-Illinois, Inc.	1.23
219327	Corning Glass Works	1.22
025069	American Cement Corporation	1.85
370514	General Portland Cement Company	1.58
483044	Kaiser Cement & Gypsum Corporation	1.35
524858	Lehigh Portland Cement Company	1.55
571443	Marquette Cement Manufacturing Company	1.73
585072	Medusa Portland Cement Company	1.41
707355	Penn-Dixie Cement Corporation	2.32
141375	Carborundum Company	1.17
370622	General Refractories Company	1.65
071372	Allegheny Ludlum Industries	1.07
087509	Bethlehem Steel Corporation	1.07
125185	C F and I Steel	1.00
457470	Inland Steel Company	1.23

TABLE A1 Continued

Compustat I D	Company	Beta Coefficient
458702	Interlake, Inc.	.92
483098	Kaiser Steel Corporation	1.10
582273	Mclouth Steel Corporation	1.80
760779	Republic Steel Corporation	.84
912656	U.S. Steel Corporation	1.03
032393	Anaconda Company	1.15
217525	Copper Range Company	.86
489314	Kennecott Copper Corporation	.91
717265	Phelps Dodge Corporation	1.15
022249	Aluminum Company of America	1.22
483008	Kaiser Aluminum & Chem. Corporation	1.58
077455	Belden Corporation	.71
369298	General Cable Corporation	1.43
761406	Revere Copper & Brass, Inc.	1.33
810640	Scovill Manufacturing Company	1.53
895861	Triangle Industries	1.26
912639	U.S. Smelting & Refining Mng	1.99
224399	Crane Company	1.24
574599	Masco Corporation	1.88
878895	Tecumseh Products Company	1.30
892892	Trane Company	.43
150033	Ceco Corporation	1.04
853819	Standard Pressed Steel Company	1.69
200273	Combustion Engineering, Inc.	1.11
350244	Foster Wheeler Corporation	1.44
118745	Bucyrus-Erie Company	1.02
149123	Caterpillar Tractor Company	1.47
406216	Halliburton Company	1.02
172172	Cincinnati Milacron, Inc.	1.57
609150	Monarch Machine Tool Company	1.62
830643	Skil Corporation	1.78
934408	Warner & Swasey	1.50
001688	AMF Incorporated	1.61
227111	Crompton & Knowles Corporation	1.17
291209	Emhart Corporation	1.45
025105	American Chain & Cable Company, Inc.	.87
216669	Cooper Industries, Inc.	1.51
456866	Ingersoll-Rand Company	1.12
590825	Mesta Machine Company	.81
122781	Burroughs Corporation	1.24
253651	Diebold, Inc.	1.63
635230	National Cash Register Company	1.27
724479	Pitney-Bowes, Inc.	1.21
631226	Nashua Corporation	1.18
369604	General Electric Company	1.21
460470	International Telephone & Telegraph	1.36
749285	RCA Corporation	1.45

TABLE A1 Continued

Compustat I D	Company	Beta Coefficient
960402	Westinghouse Electric Corporation	1.02
379568	Globe Union, Inc.	1.77
677194	Ohio Brass Company	.92
800681	Sangamo Electric Company	2.31
232165	Cutler-Hammer, Inc.	1.55
535732	Ling-Temco-Vought, Inc.	2.89
883203	Textron, Inc.	1.55
578592	Maytag Company	1.05
963320	Whirlpool Corporation	1.31
007158	Admiral Corporation	1.75
853564	Standard Kollsman Industries	2.14
989399	Zenith Radio Corporation	1.49
031897	AMP, Inc.	1.12
208291	Conrac Corporation	2.59
370838	General Signal Company	1.35
429812	High Voltage Engineering	2.25
561246	Mallory (P R) & Company	1.40
849339	Sprague Electric Company	2.08
345370	Ford Motor Company	1.15
370442	General Motors Corporation	1.07
359370	Fruehauf Corporation	1.32
964066	White Motors Company	1.83
099725	Borg-Warner Corporation	1.39
118835	Budd Company	1.50
278058	Eaton Corporation	1.63
313549	Federal-Mogul Corporation	.91
887389	Timken Company	.98
097023	Boeing Company	1.78
369550	General Dynamics Corporation	1.40
400181	Grumman Corporation	1.15
909296	United Aircraft Corporation	1.37
071041	Bath Industries, Inc.	2.07
370856	General Steel Industries	1.42
745791	Pullman, Inc.	1.07
031105	Ametek, Inc.	1.94
774370	Rockwell Manufacturing Company	1.01
770519	Robertshaw Controls	1.66
071707	Bausch & Lomb, Inc.	2.03
731095	Polaroid Corporation	1.46
457659	Insilco Corporation	1.54
209237	Consl. Freightways, Inc.	1.36
690326	Overnite Transportation Company	1.53
769739	Roadway Express, Inc.	1.35
017248	Allegheny Airlines, Inc.	1.70
210795	Continental Air Lines, Inc.	2.05
276191	Eastern Air Lines, Inc.	2.26
698057	Pan American World Airways	1.65

TABLE A1 Continued

Compustat	Company	Beta Coefficient
893349	Trans World Airlines, Inc.	2.11
957586	Western Air Lines, Inc.	2.39
030177	American Telephone & Telegraph	.73
024735	American Broadcasting	1.51
591690	Metromedia, Inc.	2.31
868035	Super Valu Stores, Inc.	.84
829098	Simpsons Ltd.	.43
640218	Neisner Bros., Inc.	1.07
980881	Woolworth (F W) Company	1.19
786514	Safeway Stores, Inc.	.73
280875	Edison Brothers Stores	1.29
432848	Hilton Hotels Corporation	1.87
398028	Greyhound Corporation	1.25
913776	Universal Oil Products	1.96
959805	Western Union Corporation	1.34

APPENDIX B

RISKLESS RATE USED IN THE DETERMINATION OF EXPECTED RETURNS -- U. S. GOVERNMENT SECURITIES, THREE MONTH BILLS

APPENDIX B

TABLE A2

Riskless Rate Used in the Determination of Expected Returns - U. S. Government Securities, Three Month Bills*

Year	Market Yield
1961	.0236
1962	.0277
1963	.0316
1964	.0354
1965	.0395
1966	.0485
1967	.0430
1968	.0533
1969	.0664
1970	.0642

*Bills Quoted on a Bank Discount Rate Basis.

Source: Board of Governors of the Federal Reserve System, Federal Reserve Bulletin, Vol. 49, No. 1 (Washington, D.C.: January, 1963), p. 48. _____, Federal Reserve Bulletin, Vol. 57, No. 1 (Washington, D.C.: January, 1971), p. A33.

APPENDIX C

MARKET RETURNS USED IN THE DETERMINATION OF EXPECTED RETURNS - STANDARD AND POOR'S COMPOSITE STOCK PRICE INDEXES

APPENDIX C

TABLE A3

Market Returns Used in the Determination of Expected Returns - Standard and Poor's Composite Stock Price Indexes

4th Quarter of 12-Month Moving Total	Dividends Per Share Adjusted to Composite Index	Stock Price Composite Index
1960	--	58.11
1961	2.02	71.55
1962	2.13	63.10
1963	2.28	75.02
1964	2.50	84.75
1965	2.72	92.43
1966	2.87	80.33
1967	2.92	96.47
1968	3.07	103.86
1969	3.16	92.05
1970	3.14	92.15

Source: Standard and Poor's Corp., Standard and Poor's Trade and Securities Statistics, Security Price Index Record (1968 ed.; New York: Standard and Poor's Corp., 1968), p. 121. _____, Standard and Poor's Trade and Securities Statistics, Current Statistics, Vol. 37, No. 10 (New York: Standard and Poor's Corp., October, 1971), p. 31.

APPENDIX D

EXAMPLE OF OUTPUT FROM "OLD TUCKREG" REGRESSION PROGRAM

APPENDIX D

Example of Output from "Old Tuckreg" Regression Program

RUN

TUCKREG Ø SEP 7Ø 14:Ø9

DO YOU WANT TO USE CONVERSATIONAL MODE? NO

REGRESSION NUMBER 1

DEPENDENT VARIABLE IS ORIGINAL VARIABLE NO. 6 DESIGNATED Y
INDEPENDENT VARIABLE (REGRESSOR): 3 DESIGNATED X1
INDEPENDENT VARIABLE (REGRESSOR): 4 DESIGNATED X2

15 OBSERVATIONS

CORRELATION COEFFICIENTS

	X1	X2	Y
X1	1	-Ø.Ø122	Ø.747
X2	-Ø.Ø122	1	Ø.ØØ49
Y	Ø.747	Ø.ØØ49	1

THE REGRESSION LINE IS:

Y-HAT = 3.46 + 11.448 X1 + 5.36 X2
(Ø.Ø43) (3.894) (Ø.Ø73)
(Ø.966) (Ø.ØØ2) (Ø.941)

Y-HAT IS THE ESTIMATED Y---T-RATIOS ARE IN FIRST ROW OF PARENTHESES---PROBABILITY THAT EACH T-RATIO COULD BE OBSERVED EVEN IF NO LINEAR RELATIONSHIP EXISTED IS IN SECOND ROW OF PARENTHESES

STATISTICAL HYPOTHESES: NO LINEAR RELATIONSHIP

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	SUM OF SQUARES	D. F.	MEAN SQUARE
EXPLAINED	57Ø1.78	2	285Ø.89
UNEXPLAINED	4511.79	12	375.983
TOTAL	1Ø213.6	14	

STATISTICAL SIGNIFICANCE OF THE REGRESSION

F(2 , 12) = 7.582
THERE IS A <.ØØ1 PROBABILITY THAT THIS
F-RATIO COULD HAVE BEEN OBSERVED EVEN IF NO LINEAR
RELATIONSHIP EXISTED.

UNBIASED ESTIMATE OF THE VARIANCE OF THE DISTURBANCE TERM IN THE MODEL	375.983
SQUARE ROOT OF ABOVE OFTEN REFERRED TO AS THE STANDARD ERROR OF ESTIMATE	19.39Ø3
R (COEFFICIENT OF MULTIPLE CORRELATION)	Ø.747165
R-SQUARED	Ø.558255

Source: J. Peter Williamson and David H. Downes, Manuals for Computer Programs in Finance and Investments, 2nd ed. (Hanover, N.H.: Trustees of Dartmouth College, 1971), Multiple Regression, pp. 5-6.

APPENDIX E

STANDARD AND POOR'S COMPUSTAT FINANCIAL FACTS USED IN THIS STUDY

APPENDIX E

TABLE A4

Standard and Poor's Compustat Financial Facts Used in this Study

Fact	Definition	Years
INV	Inventories	1958-69
DEP	Depreciation and Amortization	1959-69
NON	Nonrecurring Expense	1959-69
AVC	Available for Common	1959-69
SPC	Stock Price Close-In Dollars ** Adjusted for Stock Splits **	1960-70
SHR	Number of Shares Outstanding ** Adjusted for Stock Splits **	1959-69
D/S	Dividends per Share-In Dollars ** Adjusted for Stock Splits **	1961-70
NONN	Non-recurring Income/Expens. - Net of Tax	1959-69

VITA

Louis Serafino Corsini, the son of Louis and Josephine Corsini, was born in Boston, Massachusetts, on January 13, 1940. He graduated from Boston Latin School, Boston, Massachusetts, in June, 1957. In September of that same year he matriculated at Boston College, Chestnut Hill, Massachusetts and received the degree of Bachelor of Science and Business Administration with a major in accounting in June, 1961.

From September, 1961, until November, 1963, he was employed in the practice of public accounting. Subsequently he commenced his teaching career and taught bookkeeping and business law in the Boston Public Schools from 1963 through 1966. He was an instructor in accounting at Worcester Junior College for the school year 1966-67, and then was employed as instructor in accounting at Boston College for the school year 1967-68. During the period spanning 1964 through 1966 he was enrolled in the Boston College Graduate School of Business Administration, from which he received a Master of Business Administration degree in June, 1968. He was granted a CPA certificate from the state of Massachusetts in 1967.

In September, 1969, he matriculated at the Graduate School at Louisiana State University and served as a graduate assistant in the Department of Accounting until August, 1971, where he is currently a candidate for the degree of Doctor of Philosophy in Accounting.

Mr. Corsini is presently teaching at the Boston College School of Management.

EXAMINATION AND THESIS REPORT

Candidate: Louis Serafino Corsini

Major Field: Accounting

Title of Thesis: An Evaluation of Alternative Accounting Flow Variables for Investor Use

Approved:

J D Siebel
Major Professor and Chairman

Max Bondurant
Dean of the Graduate School

EXAMINING COMMITTEE:

James W Patillo

W Thompson

Daniel S. Kelly

Robert A Ramsey Jr

Date of Examination:

September 1, 1972